A PROPOSED FLOW OF RESOURCES MODEL WITH PARTICULAR REFERENCE TO THE NATIONAL ACCOUNTS OF THE UNITED STATES AND CANADA

By

ROBERT WILLIAM STOLAR

A DISSERTATION PRESENTED TO THE GRADUATE COUNCIL OF
THE UNIVERSITY OF FLORIDA
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

1978

To My Dear Wife

Sally

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

Abstract of Dissertation Presented to the Graduate Council in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

A PROPOSED FLOW OF RESOURCES MODEL WITH PARTICULAR REFERENCE TO THE NATIONAL ACCOUNTS OF THE UNITED STATES AND CANADA

By

Robert William Stolar

August, 1978

Chairman: Dr. S. C. Yu
Major Department: Accounting

The purpose of this research study was to develop a new flow of resources model which is more comprehensive than the currently existing Federal Reserve Board and Canadian models. The methodology used was a mixture of induction and deduction with emphasis on logical empiricism.

The initial phase of this study consisted of observations based on a critical analysis of relevant literature. The focus of attention in the analysis was on the similarities and differences between the Federal Reserve Board, Canadian and United Nations flow of resources models, and on their logical coherence and internal consistency. As a result of the critical analysis, a number of inadequacies in the existing macroaccounting models were identified, and the need for an improved model emerged as the problematic situation awaiting a solution. In addition, the analysis drew out the

meaning of a number of relevant terms, revealed a number of assumptions that are either implicit or explicit in the existing models, and identified a number of relevant concepts.

The first step in constructing the proposed model was the introduction of a set of postulates to describe the conditions under which the model would be built and to stabilize the model so that it would not be affected by variables other than the ones under consideration. The postulates were inductively derived from observations of the environment in which the model was to operate. In the subsequent development of the model, importance was attached to logical empiricism which calls for equal emphasis on syntactical and semantic rules. Syntactical propositions were inductively derived from elements observed in the various models. These elements were arranged in such a way that a logical connectivity exists between them on the one hand, and a new model is produced on the other. The syntactical propositions form the theoretical framework of the model, provide a guidance function with respect to operations, are manipulated in accordance with syntactical rules established in mathematics, and are proved as being either valid or contradictory by means of the syntactical rules.

In order to provide the model with existential content, the properties of the syntactical propositions were identified in a manner which drew out their operational

capacity. These properties were then formalized into a set of semantic propositions and provide the rules which link the theoretical plane of the model to the existential world by specifying the observations to be made and the measurement rules to be used. The truth value of the semantic propositions is verified by empirical correspondence.

Throughout the process of developing the proposed model, emphasis was placed on developing a structure which is logically coherent, internally consistent and operational. The resulting model is more comprehensive and more coherent than the existing models and therefore provides an improved framework for the accumulation and reconciliation of information. In addition, the proposed model contains features which permit integration with national income accounts and input-output tables.

Because of the features of the proposed model, it is hypothesized that the model is an improvement over the existing Federal Reserve Board and Canadian models. For this research project to be complete, however, the model must be tested empirically. This represents the second phase of the study and is beyong the scope of this dissertation.

CHAPTER I

INTRODUCTION

The purpose of this dissertation is to develop a flow of resources model that is an improvement over the currently existing Federal Reserve Board and Canadian models. The methodology used is the scientific method employing a mixture of induction and deduction with emphasis on logical empiricism.

The initial phase of this study consists of observations of empirical phenomena relating to flow of resources. The observations are made by means of a critical analysis of relevant literature encompassing such things as terminology, assumptions, and the conceptual and technical frameworks of flow of resources models. The models include on the one hand such macroaccounting models as the current Federal Reserve Board and Canadian models and their antecedents, and the United Nations model, and on the other hand the microaccounting model. Relevant observations which emerged as a result of the critical analysis of the literature are presented in Chapters II and III.

The primary objective of Chapter II is to draw out the formulation of relevant meanings and the relations among them. Thus, the first part of the chapter presents economic

concepts of flows and funds. The second part reviews the changing concepts of flows and funds in microaccounting. Here, special emphasis is placed on expressions of the American Institute of Certified Public Accountants with respect to flow of resources, and particularly on APB Opinion No. 19 and its impact on the microaccounting flow of resources model. The third and final part of the chapter reviews conceptual and technical macroaccounting precedents as reflected in the moneyflows model of Morris A. Copeland, the early flow of funds models of the Federal Reserve Board, the National Transactions Accounts of Statistics Canada, and the 1968 recommendations of the United Nations. By identifying a number of concepts, the chapter provides inductively derived elements for the proposed model in Chapter IV. These include the concept of an economic object as used by Fisher, the concept of sources and uses of resources, the concept of flows, the broad concept of funds, and the technical equality of debits and credits.

Chapter III provides a critical analysis of the current Federal Reserve Board, Canadian and United Nations flow of resources models. The analysis includes an examination of the stated objectives and purposes of each of the models, a critical analysis of the conceptual and technical frameworks of the models, and the assumptions that are implicit or explicit in the models. Throughout the analysis, the focus of attention is on the similarities and differences

between the three models, on their logical coherence and internal consistency, and on the extent to which they are complete and operational. As a result of the analysis, the chapter provides additional inductively derived elements for the proposed model in Chapter IV; these elements include the concepts of transactor, transaction, and financial and non-financial resources. The chapter also provides a number of assumptions that will be selected and incorporated into the proposed model. In addition, as a result of the analysis, a number of inadequacies in the existing models are identified, and the need for an improved model emerges as the problematic situation awaiting a solution.

Chapter IV develops the proposed flow of resources model. In developing the model, importance is attached to logical empiricism which calls for equal emphasis on syntactical and semantical rules. It is therefore necessary to make a distinction between the theory plane of the model and the empirical plane. The theory plane contains the theoretical framework of the model and provides a guidance function with respect to operations, whereas the empirical plane represents the existential world and provides the empirical content of the model. The first step in constructing the model is the introduction of a number of postulates to describe the conditions under which the model will be built, and to stabilize the model so that it will not be affected by variables other than the ones under consideration. The postulates are in-

ductively derived from observations of the environment in which the model is to operate.

The introduction of postulates is followed by the formulation of a set of syntactical or analytic propositions called theoretical constructs. These are presented in the form of nominal definitions containing linguistic expressions which represent the inductively derived theoretical elements of the model. The linguistic expressions are then converted to abstract symbols which are arranged in such a way that a logical connectivity exists between them. In addition, the symbols are subject to manipulation in accordance with a set of syntactical rules established in mathematics. The truth value of the theoretical constructs is proved as being either valid or contradictory by means of the syntactical rules.

For the model to have empirical import, it is necessary to operationalize the theoretical frame of reference. This is accomplished by identifying the properties of the theoretical constructs in a manner which draws out their operational capacity. The process involves a back-and-forth movement between the theoretical plane and the empirical plane. The properties of the theoretical constructs are then formalized into a set of semantical propositions called operational constructs which set forth their operative capacity for subsequent manipulations. Their truth value is verified by empirical correspondence. The operational constructs therefore provide the semantical rules which link the

theoretical plane to the empirical plane by specifying the observations to be made and the measurement rules to be used.

Throughout the process of developing and illustrating the proposed model, emphasis is placed on developing a structure which is logically coherent, internally consistent and operational. Chapter IV concludes by deducing that given the stated uses and purposes of flow of resources information, the proposed model provides more useful and more accurate information than do the current Federal Reserve Board and Canadian models. It is therefore hypothesized that the proposed model is an improvement over the existing models. For the research project to be complete, however, the model must be tested empirically. This represents the second phase of the study and is beyond the scope of this dissertation.

CHAPTER II

ANTECEDENTS OF EXISTING MACROACCOUNTING MODELS

The antecedents of existing macroaccounting models are to be found in economics, microaccounting and the early pioneering work of Morris A. Copeland in the field of macroaccounting. The purpose of this chapter is to provide a brief historical sketch of the development of salient accounting concepts and techniques. Most of the concepts discussed have been the subject of considerable controversy, and both the concepts and techniques have a direct bearing on the critical analysis and proposed model in subsequent chapters.

Economic Concepts

The term "capital" has been variously defined by economists as accumulated saving, that part of a person's whole stock that affords him revenue, that part of the wealth of a country which is employed in production, the result of human exertion employed in the production or distribution of wealth, an accumulated stock of the products of former labor, a group of products which serve as a means to the acquisition of goods, effective social utility, etc.

Nevertheless, although capital has been variously defined, all economists have used the term in the broad sense of all non-human resources.

Another economist, Irving Fisher, expressed the view that "there are two sources to which we must look for the justification of economic terms: first, economic usage, and second, popular and business usage" (1904, p. 389). Accordingly, Fisher made a distinction between capital and flows by defining capital as a stock or fund of wealth and flows as a stream of wealth (1912, p. 51).

Wealth as perceived by Fisher consisted of appropriated objects (1912, p. 4). These objects included "all those parts of the material universe which have been appropriated to the use of mankind" (1912, p. 74) and consisted of real estate, commodities and human beings. Real estate included land for buildings, crops, grazing, timber, mining, hunting and fisheries; buildings and other structures such as bridges and subways; and transit systems such as railroads, highways and waterways. Commodities included mineral, agricultural and manufactured raw materials; and consumable and durable finished products.

Flows, on the other hand, consisted of a stream of services flowing from a stock of wealth and included "a quantity produced, consumed, exchanged, or transported during a period of time" (1912, p. 7). Elsewhere, he stated that capital is a fund and that income is a flow (1912, p. 52).

Conceptually then, capital is a stock of resources and flows are a stream of resources. Moreover, the relationship between stocks and flows is such that flows are inseparable from stocks and stocks from flows, for conceptually flows have stocks as their source while stocks are a measure of resources as at an instant of time.

Microaccounting Concepts

Early Accounting Concepts of Funds and Flows

The annual financial accounting reports produced by financial accountants normally consist of the balance sheet, the income statement and the statement of changes in financial position. The balance sheet describes an accounting entity's stock of financial and productive resources as at a moment of time, while the income statement supplies information on the results of productive activity.

The statement of changes in financial position describes the interaction that takes place between financial and productive resources and provides data on how productive activity is financed. Thus, the statement may be said to provide a link between the balance sheet and the income statement in that it discloses information that can be obtained only partially from the other two statements. The early accountants who sought to develop this statement

of financial position included W. M. Cole, H. A. Finney and P. J. Esquerré.

W. M. Cole. One of the early flow of resources statements in microaccounting was Cole's "Summary of Transactions" (Cole, 1908). The basis of such a statement involved three main concepts. First, the stock of resources of an accounting entity consists of all of its recorded assets and liabilities as at a given moment of time. Second, the flow of resources of an accounting entity is the change in each asset and liability account between two given points of time. Third, a source of resources involves a simultaneous use of resources, and conversely a use of resources involves a simultaneous source of resources.

These concepts were made operational in the following way. The accounting entity's balance sheets (stock of resources) were compared as at two given points of time. The change (flow) in each asset and liability account was then calculated. Finally, the changes were arranged into two columns; a credit column called "where-got" showing the sources of change, and a debit column called "where-gone" showing the destinations or uses of change. Because of the technical equality of debits and credits, it followed that the conceptual equality of sources and uses of resources were maintained.

Cole's conceptual approach approximated economic concepts with respect to stocks and flows in that he used

an "all resources" interpretation of stocks and accounted for all of the changes (flows) in those resources. However, contemporary accountants objected to his form of presentation on the grounds that simply listing changes in resources failed to explain the reasons for the change.

H. A. Finney. In an attempt to overcome objections to Cole's statement, Finney published his version of a solution to a national C.P.A. examination question asking for a "statement of resources and their application" (Finney, 1921a, p. 64). The solution contained a three-part flow of resources statement consisting of a comparative balance sheet with decrease-increase columns, a statement of application of funds, and a schedule of working capital and deferred charges. The focus of attention was on changes in working capital items.

Responding to criticism that he had failed to define the term funds, Finney replied that funds meant resources. Elsewhere, he restricted the meaning of resources to working capital items (December, 1923, p. 461) and thus started a controversy over the meaning of funds which has endured to this day.

P. J. Esquerré. Esquerré was one of the first accountants to question the meaning of the term "funds" as introduced by Finney. He also objected to Finney's format on the grounds that neither accountants nor laymen could

understand it, and presented an alternative approach (May, 1925, pp. 424-430). Instead of Finney's "statement of application of funds" and supporting "schedule of working capital," he presented a single "statement of resources and application."

Esquerré's statement used three classifications rather than the two used by Cole, and demonstrated an effort by him to highlight balance sheet changes leading to increases in resources, decreases in resources, and increase in resources through investment of profits. Like Cole, Esquerré focused on the sources and uses of all resources of an enterprise, and did not limit the meaning of resources to working capital as Finney had done. However, his form of presentation failed to gain general acceptance.

The Search for a Deeper Meaning of Funds

Following the introduction of the term "funds" by Finney, and given his explanation of the sense in which he was using it, many accounting writers started to search for a deeper meaning of the term. Suggested definitions have included cash, cash-equivalent, money assets, net quick assets, working capital, net working capital, total assets, financial liquidity, enterprise liquidity, capital funds, pooled resources, purchasing power, economic service-potentials, and all financial resources.

Thus, through the years the definition of funds has come to range all the way from the very restricted meaning of cash to the broad meaning of "all resources" as used by Cole and Esquerré. At present, there is no single, accepted definition of funds in microaccounting, and use of the term imparts controversy and confusion.

Expressions of the American Institute of Certified Public Accountants

In the wake of confusion over the meaning of the term funds, the American Institute of Certified Public Accountants issued Accounting Research Study No. 2 in 1961, APB Opinion No. 3 in 1963, and APB Opinion No. 19 in 1971.

Accounting Research Study No. 2. This study advocated an "all-financial resources" interpretation of funds for two reasons. First, it was argued that narrower definitions such as cash or working capital result in the exclusion from flow of funds statements of transactions which do not affect cash or working capital, but which nevertheless may be significant. Second, it was argued that frequently a single figure of increase or decrease in working capital is shown to the exclusion of significant changes in the components of that figure (p. 52).

APB Opinion No. 3. This opinion was issued two years after the publication of Accounting Research Study No. 2 and

recommended the adoption of an "all financial resources" concept of funds. The purpose of the recommendation was to overcome the problem that a narrow concept of funds such as working capital or cash results in significant non-fund transactions being excluded from the statement of source and application of funds. But by far the most common definition of funds continued to be working capital and consequently APB Opinion No. 19 was issued in 1971.

APB Opinion No. 19. This opinion was important from both a technical and a conceptual point of view. The technical recommendations were that:

1. Because of confusion over the meaning of the term funds, the statement of source and application of funds should be renamed "the statement of change in financial position."

2. The funds statement should prominently disclose either working capital or cash provided from or used in operations for the period.

3. Net changes in each element of working capital (as customarily defined) should be appropriately disclosed.

4. If the format highlights flow of cash, changes in other elements of working capital should be disclosed in appropriate detail.

5. Disclosure should be made of all significant financing and investing transactions that do not involve working capital.

The conceptual framework underlying the recommendations was as follows:

1. APB Opinion No. 19 distinguished two types of resources: working capital resources and non-working capital resources.

2. An accounting entity's total stock of resources consists of working capital and non-working capital resources.

3. Every movement of resources involves a use of resources and a simultaneous source of resources.

4. Interaction takes place between resources in the following ways:

   a) Between non-working capital and working capital resources.

   b) Between purely working capital resources.

   c) Between purely non-working capital resources.

Conceptually, every movement of resources involves a use of resources and a simultaneous source of resources. Thus, the purchase of a machine on credit, for example, involves the use of non-working capital resources (acquisition of the machine) and a simultaneous source of working capital resources (increase in accounts payable). Conversely, the issue of capital stock for cash involves a source of non-working capital resources (issue of the capital stock) and a simultaneous use of working capital resources (increase in cash).

The movement of resources, however, may involve only working capital resources. For instance, the payment of a debt would involve the use of working capital resources (reduction in liabilities) and a simultaneous source of working capital resources (reduction in cash). Conversely, the disposal of inventory for cash would involve a source of working capital resources (reduction in inventory) and a simultaneous use of working capital resources (increase in cash). The net effect would be neither an increase nor a decrease in the total stock of working capital resources.

Similarly, the movement of resources may involve only non-working capital resources. The purchase of land in return for capital stock would involve a use of resources (acquisition of the land) and a simultaneous source of resources (issue of the capital stock). Conversely, the sale of a building secured by a mortgage would involve a source

of non-working capital resources (disposal of the building) and a simultaneous use of resources (acquisition of a mortgage receivable).

Prior to APB Opinion No. 19, only those movements of resources involving interaction between non-working capital resources and working capital resources were required to be reported. Excluded were movements of resources which were either purely non-working capital resources or purely working capital resources, regardless of how significant the movements were. APB Opinion No. 19 is therefore important because it recommends focusing attention on all of the resources of an accounting entity, and disclosing all significant movements and interactions of those resources.

Macroaccounting Precedents

Copeland's Moneyflows

It was Morris A. Copeland who pioneered the development of flow of resources in macroaccounting. His objective was to develop a system of measurement of moneyflows in order to explain their cyclical increases and decreases. To accomplish this he sought to determine for each type of transaction the dollar volume of receipts and the dollar volume of expenditures for each group of transactors.

Conceptual framework. From microaccounting Copeland borrowed the concept of funds and flows. Funds were interpreted narrowly by him to mean a stock of money and its close substitutes such as trade credit. Flows were defined as receipts (inflows) and dispositions (outflows) of money.

To the above Copeland added his concept of transactor and transaction. A transactor was defined to be an accounting entity that receives and makes money payments, and could be a person, sole proprietorship, partnership, corporation, government, or other entity. A transaction was defined as an exchange between transactors involving the use of money or its close substitutes.

Copeland identified two distinct types of transactions. On the one hand were nonfinancial transactions involving ordinary cash receipts and disbursements with respect to sales and purchases of goods and services. On the other hand were financial transactions pertaining to the manner in which the nonfinancial transactions were financed. Conceptually, a transaction was either purely financial or partly financial and partly nonfinancial. Because Copeland's main objective was to measure the flow of money, purely nonfinancial transactions were excluded from the model.

Technical framework. For his technical framework, Copeland grouped transactors into 11 economic sectors, and classified transactions into 14 types. There was also a uniform classification of accounts based on the double-entry bookkeeping system of microaccounting so that for every debit in the accounts there was an equal and offsetting credit.

Each type of transaction was summarized in a balancing national account showing the magnitude of inflows of money (receipts) and outflows of money (dispositions) for each sector in the account. Because of the technical equality of debits and credits, it follows that for the economy as a whole, total inflows of money equals total outflows. But for any one sector inflows may exceed outflows in which case that sector has a favorable balance which Copeland calls saving. Saving in turn is a measure of the extent to which the sector has either reduced its own debt to other sectors, or made money available to them.

Conversely, outflows may exceed inflows in which case the sector has an unfavorable balance called dissaving. Dissaving for its part is a measure of the extent to which a sector has either increased its debt to other sectors or borrowed money from them.

Copeland developed his moneyflows accounts independently of the national income and product accounts of the

Department of Commerce. It was his original position that moneyflows accounts on the one hand and national income and product accounts on the other should be prepared from two completely different perspectives, the former accounts being prepared on a cash basis, the latter on an accrual and imputation basis. Such an approach, argued Copeland, had the advantage of enabling economists to view the economy from different approaches and on the basis of different measurements (1952, p. 24). Later, he changed his point of view (Sigel, 1955, p. 288).

The conceptual and technical framework of the Copeland accounts served as a basis for the subsequent development of flow statements by the Federal Reserve Board and Statistics Canada.

Subsequent Development of Flow Accounts

The Federal Reserve Board Accounts. The conceptual, structural and statistical development of Copeland's work was continued by the staff of the Federal Reserve Board. The Board's accounts were introduced in 1955 with the stated objective of providing "a comprehensive and systematic economic record that will facilitate study of the interrelations among financial and nonfinancial processes" (Board of Governors, 1955, p. 6).

The main modification made to Copeland's accounts was to extend their scope from a near-cash basis to a near-accrual basis. Influenced by Copeland's focus on money-flows, however, the original objective of the Federal Reserve Board model was to include all transactions in the economy that were effected by a transfer of credit and/or money (1955, p. 1). Thus, imputations and barter transactions continued to be excluded. In addition, the flow accounts continued to lack integration with the national income and product accounts, and complex reconciliation tables were required in order to move from one set of accounts to the other.

Subsequent development of the accounts, however, led to the adoption of a substantial portion of the scope, definitions and data of the Department of Commerce accounts. As a result, the sector balances for saving and capital investment in the Federal Reserve Board model are now mainly a distribution of the national totals for saving and investment as shown by the Department of Commerce.

Technically speaking, however, the flow accounts and the income and product accounts are still not completely integrated. Although the complex reconciliation tables required for the Copeland and early Federal Reserve Board accounts are no longer necessary, some adjustments must still be made. A major difference lies in the definition of investment. Whereas the Department of Commerce excludes

purchases of consumer durable goods as investment, they are included as such in the Federal Reserve Board accounts. The latter accounts therefore show a smaller amount for current expenditures and a larger amount for investment and depreciation. Other smaller differences between the two sets of accounts also exist.

The Canadian accounts. The Canadian accounts were introduced in 1958 by the Royal Commission on Canada's Economic Prospects. Initially called the National Transactions Accounts and subsequently named the Financial Flow Accounts, they have been described as the direct heirs of the pioneer work done by Copeland and the Federal Reserve Board (Read, 1957, p. 27). However, an initial decision not to follow the lead of Copeland and the Federal Reserve Board in preparing the accounts independently of the national income and expenditure accounts resulted in a considerably modified version of the then current Federal Reserve Board model.

The initial decision stemmed from a difference in traditions in the two countries. In the United States, the gathering of statistical data was not centralized. In Canada on the other hand, not only was such work centralized in Statistics Canada (then the Dominion Bureau of Statistics), but that particular branch of government was actively pursuing a policy of developing a standardized accounting framework. As a result, with the introduction of integrated

input-output tables in 1949, and the publication of integrated figures for personal savings in 1953, precedents had already been established for producing estimates which were consistent with the concepts underlying the national income and expenditure accounts.

Hence, with this background, and because no compelling reasons could be found for not integrating the flow accounts, it was decided to extend the national income and expenditure accounts in two directions. On the one hand, Persons, Business, Government and Non-Residents which constituted the four broad sectors of the national income and expenditure accounts were further subdivided to produce the sectors desired for flow accounts. On the other hand the transaction categories of the national income and expenditure accounts were extended beyond the area of transactions in real goods and services in order to reveal transactions in financial instruments.

The result was a model which had as its stated objective the recording within a standardized system of classification all economic transactions taking place in the national economy. Included in the accounts were accruals, imputations and payments in kind.

The United Nations accounts. In 1968, the United Nations published what is referred to as the "new" System of National Accounts. This new system was a revision of the System of National Accounts which had been formulated

in 1952 and extended the accounts of the old system to include detailed input-output and flow of funds tables. The system was developed in collaboration with a group of experts convened by the Secretary-General of the United Nations, and was designed to provide international guidance to nations wishing to improve and extend their macro-accounting systems.

The United Nations model presented a systematic framework of accounts in matrix form. The accounts included accruals, payments in kind and imputations. The main innovation in the accounts, however, was the introduction of balance sheet accounts. The United Nations model, the Federal Reserve model, and the Canadian model are the subject of critical analysis in the next chapter.

Summary

Although capital and wealth have been variously defined in economics, in general economists have used the term in the broad sense of all resources. Stocks are a measure of resources as at a moment of time while flows are a stream of resources over a period of time. Conceptually, the two are interrelated in that flows have stocks as their source while stocks are a measure of resources as at a moment of time.

Early accountants who sought to develop a flow of resources statement to supplement the existing stock statement and income statement included Cole, Esquerré and Finney.

However, Finney's introduction of the term "funds" as a synonym for resources led to controversy and confusion as accountants debated whether funds meant cash resources, all resources, or something in between. Although the debate has not been resolved, the American Institute of Certified Public Accountants has recommended recently an all resources concept with emphasis on the reporting of all significant movements of these resources.

By way of contrast, Copeland adopted a concept of funds in the narrow sense of money rather than the broad sense of all resources, and focused attention on the magnitude of transactions involving money rather than the movement of resources. This difference in orientation was the result of his attempt to develop a system of measurement of moneyflows.

Subsequent development of macroaccounting models has witnessed a movement away from Copeland's focus of attention on moneyflows. Thus, the Federal Reserve Board model initially moved from a near-cash to a near-accrual basis and subsequently included imputations and payments in kind. The Canadian model was introduced with complete integration of flow accounts with the national income and expenditure accounts. Finally, the introduction of the United Nations model extended the scope of flow accounts to include all balance sheet accounts. These three models are the subject of critical analysis in the next chapter.

CHAPTER III

A CRITICAL ANALYSIS OF EXISTING MODELS

This chapter analyzes critically the Federal Reserve Board, Canadian and United Nations flow of resources models. The approach is to examine the stated objectives and purposes of each of the models, observe and critically review their technical and conceptual frameworks, set out the assumptions that are explicit or implicit in the models, and finally to present models to illustrate the technical framework and the relationship of concepts to the framework and to one another.

The focus of attention in the analysis is the logical coherence and internal consistency of the models, and the extent to which they are complete and operational. As a result of the analysis, a number of inadequacies in the existing models are identified, and the need for an improved model is indicated.

Purpose Of The Accounts

The Federal Reserve Board Model

According to the Federal Reserve Board, the purpose of flow of resources accounts is twofold. The first purpose

is to provide the aggregate measures of transactions needed to identify the "influences of the nonfinancial economy on financial markets," and "reciprocal influences of financial market developments on demand for goods and services, sources and amounts of saving and investment, and the structure of income" (Board of Governors, 1975, p. 2).

The second purpose of the accounts is to provide an empirical base for exploring such questions as the sensitivity of borrowing to interest rates as against other influences, the effects of cost and supply of credit on physical investment demand, the role of money holdings in the public's structure of assets and liabilities, and the relation of financial assets and liabilities to demands for goods and services, for credit, and for investment in financial claims (1975, p. 2).

Earlier, the Federal Reserve Board had stated that the purpose of the accounts was to determine and reveal two things: one, the interactions between financial and nonfinancial flows of funds through the economy, and two, the patterns of saving and investment. The information thus provided is used in economic analysis and the formation of monetary and other economic policies (Board of Governors, 1959, p. 828). Elsewhere, the Federal Reserve Board had said that the purpose of the accounts was to analyze changes in liquidity, portfolio composition, credit availability, and incentives to use credit on markets for goods and services

and, consequently, on the changing total and composition of spending and output. Another purpose that was identified at the time was the analysis of the influence of changes in the level and pattern of income, prices, expenditures and output on the flow of funds through financial channels (Board of Governors, 1955, p. 1).

The Canadian Model

The Preliminary Report issued by the Dominion Bureau of Statistics (now Statistics Canada) in 1969 identified four purposes of flow of resources accounts. These were to relate the nonfinancial activity of the economy to the developments of the financial markets, to analyze past events, to plan, and to forecast future events (1969, pp. 24-25).

Several other uses were suggested by the Royal Commission on Canada's Economic Prospects (Hood, 1958, p. 473). The first was that the accounts contribute to knowledge of the functioning of the economy and thus provide government with a guide to making decisions about such things as measures to counter depression, combat inflation, or mobilize resources in time of crisis. Second, the accounts provide the business community with a set of tools for appraising the course of economic events, assessing the economic outlook, and adapting business policies to meet emerging trends. Third, the accounts provide a comprehensive view of such

nonfinancial and financial interrelationships of the economy as how the investment programs of various groups of transactors will be financed and what their impact will be on the capital market as a result; how sectors vary in their dependence upon external as opposed to internal financing, long versus short-term borrowing, and marketable as opposed to non-marketable instruments; how flexible financial intermediaries are; and how a given set of borrowers will be affected if financial intermediaries provide relatively larger financing to others.

The United Nations Model

In describing the purposes and uses of its accounts, the United Nations stated that they were "mainly designed to furnish information concerning the market and the classes of creditors in the case of each category of instruments" (1968, p. 145). A second purpose was stated to be "to indicate the magnitude and composition of transactions in the international reserves, and offsets to these reserves, of a country" (p. 145). Still another purpose was said to be to focus "on the transactions in financial claims which are of particular importance in the analysis of monetary conditions and policies and the related aspects of the balance of payments" (p. 145).

Technical Framework Of Existing Models

Transactors

The economies of the United States and Canada consist of a myriad of individual transactors. These transactors include persons, sole proprietorships, partnerships, corporations, sectors of the economy and nations. One of the tasks of macroaccounting is to group these transactors into sectors which are sufficiently few in number to be useful for analytical purposes, but which are at the same time reasonably homogeneous.

The Federal Reserve Board model. This model groups transactors into sectors on the basis of "commonly identifiable economic units" (Board of Governors, 1975, p. 27). For the purposes of this model the following four principal sectors are used:

Private domestic nonfinancial sector

Financial sector

U. S. Government sector

The Rest of the world

Some of these sectors in turn are further subdivided into subsectors which total twenty at the most detailed level.

A second level of sector detail breaks the private nonfinancial sector into three parts consisting of households, business, and state and local governments. Similarly,

the financial sector is broken into four parts consisting of federally sponsored credit agencies, monetary authorities, commercial banks and private nonbank finance.

The Canadian model. "The legal entity is the main unit of classification of transactors" in the Canadian model (Statistics Canada, 1977, Preface). The model contains the following thirteen sectors (pp. 4-5):

Persons and Unincorporated Business
Nonfinancial Private Corporations
Nonfinancial Government Enterprises
The Monetary Authorities
Chartered Banks
Near-Banks
Insurance Companies and Pension Funds
Other Private Financial Institutions
Public Financial Institutions
Federal Government
Provincial and Local Governments and Hospitals
Social Security Funds
Rest of the World

No further subdivisions of these sectors are carried out.

The United Nations model. The United Nations model groups transactors into sectors "primarily in the light of differences in their financial role, behaviour and experience" although classification according to "major kind of economic

activity" is also recommended (1968, p. 78). Five principal sectors are distinguished in the model as follows:

Nonfinancial enterprises, corporate and quasi-corporate

Financial institutions

General government

Private non-profit institutions serving households

Households, including private nonfinancial unincorporated enterprises

As in the Federal Reserve Board model, some of the United Nations sectors are further subdivided into subsectors. Thus, the nonfinancial enterprises sector is broken into two parts consisting of private enterprises and public enterprises. The financial institutions sector is subdivided into the central bank, other monetary institutions, insurance companies and pension funds, and other financial institutions. Finally, the general government sector is subdivided into central government, state and local government, and social security funds.

Thus, in the three models the basis of classifying transactors into groups is variously defined as commonly identifiable economic units (Federal Reserve Board), the legal entity (Canada), and the financial role, behavior and experience of transactors (United Nations). In each of the models, however, the account classifications are similar,

reflecting as they do on the one hand institutional groups such as households, business, government and the rest of the world, and on the other hand economic activity within these groups such as commerce, finance, government transfers, and so forth. For the purpose of brevity, the sectors will be referred to generally as households, business, government and the rest of the world throughout the remainder of this study.

Transactions

Just as an economy contains a myriad of individual transactors, so there are millions of individual transactions. And just as one of the tasks of macroaccounting is to group transactors into relatively homogeneous sectors, so another task of macroaccounting is to classify transactions into relatively homogeneous groups which are sufficiently few in number and homogeneous in nature to facilitate analysis.

In all three models a distinction is made between nonfinancial and financial transactions. Within each of these two broad classifications further distinctions are made. Nonfinancial transactions are classified into current transactions and capital transactions, while financial transactions are classified into transactions in financial assets on the one hand and liabilities on the other.

In general, current transactions consist of income distribution through payments to factors of production,

expenditures by persons, business, government and the rest of the world, and income redistribution by means of transfers. More specifically, these transactions include wages and salaries, purchases and sales of goods and services, entrepreneural income, property income, taxes, and grants, subsidies and other transfers.

Capital transactions are commonly referred to as transactions in real assets and consist of transactions in new physical capital, transactions in existing physical capital, and change in the value of business inventories. Transactions in new physical capital include expenditures on new construction such as buildings, houses, machinery and equipment, and imports of new and used machinery and equipment. Transactions in existing physical capital include purchases and sales of land, used buildings, and second-hand machinery and equipment. The value of the physical change in inventories represents the investment by business in current production that has not yet been sold.

Financial transactions are grouped into categories based on the type of financial instruments involved. The categories consist of credit market instruments such as consumer credit, bank loans, bonds and mortgages; deposit claims on financial institutions including demand deposits and currency, time deposits at commercial banks, and savings accounts at savings institutions; monetary reserves; and

other claims such as taxes payable, trade credit and security credit. Examples of financial assets include cash, accounts receivable, notes receivable, and securities of various sorts such as stocks and bonds. Liabilities include such items as accounts payable, notes payable, bonds payable and mortgages payable and imply the existence of equal and offsetting financial assets. Thus, liabilities are always financial in nature, for one person's debt is always some other person's asset.

Each of the three models records the receipt and payment aspects of economic transactions. A receipt may be revenue, an increase in liabilities or a decrease in assets, whereas a payment may be an expenditure, an increase in assets or a decrease in liabilities. Thus, current transactions are recorded as receipts and payments, each is aggregated into a balance for a given period of time, and the excess of one over the other is a net balance representing a sector's saving or dissaving.

Capital transactions are also recorded as receipts and payments, and are aggregated and then netted to produce a balance that represents a sector's investment or disinvestment in real assets. Similarly, transactions in financial assets on the one hand and liabilities on the other are recorded as receipts and payments, and aggregated and then netted to produce balances representing a sector's net change in financial assets and liabilities. These changes

are netted in turn to provide a balance representing a sector's investment or disinvestment in financial claims for a given period of time.

The Accounting Framework

Basic to the microaccounting and macroaccounting models is the technical equality of debits and credits. A debit represents an expenditure, an increase in liabilities or a decrease in assets. For every debit there is an equal and offsetting credit, and total debits therefore equal total credits.

In each of the macroaccounting models the focus of attention is on both parties to a transaction. Consequently, each recorded transaction is reflected in at least four entries in the accounts of the participating transactors, once as a debit and an equal credit for the one transactor, and once as an offsetting credit and an equal debit for the other transactor. Debits record the payment aspect of a transaction while credits record the receipt aspect; since debits are equal to credits, receipts are equal to payments.

By way of illustration, assume that economic transactions involve

1. Current goods and services (c)
2. Real assets (k)
3. Financial claims consisting of financial assets (f_a) and liabilities (f_l)

Further assume that an economy consists of two transactors, A and B. A possesses

1. A stock of current goods and services consisting of c_1
2. A stock of real assets consisting of k_1
3. A stock of accounts receivable consisting of f_{a_1}
4. A stock of liabilities consisting of f_{l_1}

Similarly, B possesses

1. A stock of current goods and services consisting of c_2
2. A stock of real assets consisting of k_2
3. A stock of accounts receivable consisting of f_{a_2}
4. A stock of liabilities consisting of f_{l_2}

Other symbols to be used in the illustration include the following:

1. DR = Debit
2. CR = Credit
3. P = Payment
4. R = Receipt
5. Σ = Aggregate

A and B may enter into an economic transaction with one another that is either purely nonfinancial, partly nonfinancial and partly financial, or purely financial.

Purely nonfinancial transactions. Assume that A and B enter into a purely nonfinancial transaction in current goods and services and that the exchange price of c_1 and c_2 is equal.

On A's books, the exchange of c_1 for c_2 involves the following two entries:

$$DR = P_{c_2}$$

$$CR = R_{c_1}$$

Similarly, on B's books, the exchange of c_2 for c_1 involves the following two entries:

$$DR = P_{c_1}$$

$$CR = R_{c_2}$$

However, since

$$\Sigma DR = \Sigma CR$$

then

$$P_{c_1} + P_{c_2} = R_{c_1} + R_{c_2}$$

and

$$\Sigma P = \Sigma R$$

Thus, for the economy as a whole, the transaction nets out to zero.

Partly nonfinancial and partly financial transactions. Assume now that A and B enter into a partly nonfinancial and partly financial transaction in which A exchanges k_1 in return for f_{a_1}. On A's books this transaction would be recorded as follows:

$$DR = P_{f_{a_1}}$$

$$CR = R_{k_1}$$

For B, the transaction involves the acquisition of k_1 in exchange for f_{l_2} and would be recorded as follows:

$$DR = P_{k_1}$$

$$CR = R_{f_{l_2}}$$

However, one person's debt is another's asset, and therefore

$$P_{f_{a_1}} = R_{f_{l_2}}$$

Moreover, since

$$P_{k_1} = R_{k_1}$$

and

$$\Sigma DR = \Sigma CR$$

then

$$P_{f_{a_1}} + P_{k_1} = R_{f_{l_2}} + R_{k_1}$$

and

$$\Sigma P = \Sigma R$$

Thus, for the nation as a whole, the transaction nets out to zero.

Purely financial transactions. Assume now that A and B enter into a purely financial transaction in which f_c represents cash, and A exchanges f_{a_1} in return for f_c. On A's books this transaction would be recorded as follows:

$$DR = P_{f_c}$$

$$CR = R_{f_{a_1}}$$

In the case of B, the transaction involves exchanging f_c in return for liquidation of f_{l_2}, and would be recorded as follows:

$$DR = P_{f_{l_2}}$$

$$CR = R_{f_c}$$

Once again, since

$$\Sigma DR = \Sigma CR$$

it follows that

$$P_{f_c} + P_{f_{l_2}} = R_{f_c} + R_{f_{a_1}}$$

and hence

$$\Sigma P = \Sigma R$$

Thus, as in the case of purely nonfinancial transactions on the one hand, and partly nonfinancial and partly financial transactions on the other, for the nation as a whole purely financial transactions net out to zero.

A and B may enter into any number of transactions during a given period of time. At the end of the period one may aggregate for A and B individually the total current receipts and payments, the total capital receipts and payments, and the total financial receipts and payments for financial assets and liabilities. Because of the technical equality of debits and credits, for the economy as a whole as represented by A and B

$$\Sigma R_c = \Sigma P_c$$

$$\Sigma P_k = \Sigma R_k$$

$$\Sigma P_{f_a} = \Sigma R_{f_l}$$

For any one transactor, however, it is more likely that

$$\Sigma R_c \gtrless \Sigma R_k$$

$$\Sigma P_k \gtrless \Sigma R_k$$

$$\Sigma P_{f_a} \gtrless \Sigma R_{f_a}$$

$$\Sigma R_{f_l} \gtrless \Sigma P_{f_l}$$

Given that

S^S = Saving

S^D = Dissaving

I^I_k = Investment in real assets

I^D_k = Disinvestment in real assets

I^I_f = Investment in financial assets

I^D_f = Disinvestment in financial assets

neg = Negative

and bearing in mind that for the economy as a whole

$$\Sigma DR = \Sigma CR$$

then the following relationships exist:

1. A's records will show

$$S^S = \Sigma R_c - \Sigma P_c \text{ if } \Sigma R_c > \Sigma P_c$$

in which case, in order to maintain the technical equality of debits and credits, B's records will show

$$S^D = \Sigma P_c - \Sigma R_c$$

2. A's records will show

$$I^I = \Sigma P_k - \Sigma R_k \text{ if } \Sigma P_k > \Sigma R_k$$

in which case B's records will show

$$I^D = \Sigma R_k - \Sigma P_k$$

3. A's records will show

$$I_f^I = (\Sigma P_{f_a} - \Sigma R_{f_a}) + (\Sigma R_{f_l} - \Sigma P_{f_l}) \text{ where}$$

$$(\Sigma P_{f_a} - \Sigma R_{f_a}) + (\Sigma R_{f_l} - \Sigma P_{f_l}) \text{ is positive}$$

in which case B's records will show

$$I_f^D = [\ (\Sigma R_{f_a} - \Sigma P_{f_a}) + (\Sigma P_{f_l} - \Sigma R_{f_l})\ ] \text{ neg}$$

The foregoing illustration may be modified so that A and B are transactors in a single sector of the economy rather than in the economy as a whole. The illustration may be modified even further to extend the number of transactors in a given sector and the number of sectors in a given economy from two to any indefinite number. Within such a framework, transactions between transactors within a given sector will net out to zero just as they have between A and B, and what will remain are the results of transactions between sectors of the economy.

For the economy as a whole, the accounts reflect the amount of each sector's saving or dissaving, the amount of each sector's expenditure on real assets, the excess of saving over expenditure on real assets, and the financial channels by means of which the excess is transferred from sectors which have a surplus to those that have a deficit. Because of the technical equality of debits and credits, total receipts equal total expenditures, total saving equals

total investment and total lending (financial assets) equals total borrowing (liabilities). Any balance remaining represents net borrowing or lending abroad.

Integration of Accounts

The Federal Reserve Board model. It was noted in Chapter II that sector balances for saving and capital investment in the Federal Reserve Board model are now mainly a distribution of the national totals for saving and investment as shown in the National Income and Product Accounts prepared by the Department of Commerce. Technically speaking, however, the flow of funds accounts and the national income and product accounts are still not completely integrated. Although the complex reconciliation tables required for the Copeland and early Federal Reserve Board accounts are no longer necessary, some adjustments must still be made. A major difference lies in the definition of investment. Whereas the Department of Commerce excludes purchases of durable goods as investment, they are included as such in the Federal Reserve Board accounts. The latter accounts therefore show a small amount for current expenditures and a larger amount for investment and depreciation. Other smaller differences between the two sets of accounts also exist.

The Canadian model. The Canadian financial flow accounts are completely integrated with the national income and expenditure accounts. Two of the main factors contributing to the integration are common definitions and the treatment of financial flow accounts as an extension of the income and expenditure accounts. Thus, on the one hand, Persons, Business, Government and Non-Residents which constitute the four broad sectors of the national income and expenditure accounts are further subdivided to produce the sectors desired for flow accounts. On the other hand, the transaction categories of the national income and expenditure accounts are extended beyond the area of transactions in real goods and services in order to reveal transactions in financial instruments.

The United Nations model. The United Nations accounts are presented in two forms. One form consists of standard accounts. However, these are incomplete in that they are limited to flow accounts and exclude national and sector balance sheets. The other form of presentation consists of matrices containing two types of accounts. The first type comprises the production, consumption expenditure and capital formation accounts and classifies transactors according to industrial, government and private services activities. The second type comprises the source and disposition of income, capital finance and balance sheet

accounts and classifies transactors into the five institutional sectors of the model. Integration between the two types of accounts is achieved by means of "dummy accounts" through which balances appearing in the activities accounts are reallocated over the appropriate institutional sector accounts. However, in a 1971 report to the United Nations, Statistics Canada asserted that the activity accounts of the United Nations model do not adequately relate to the institutional sector accounts, and questioned the appropriateness of classifications according to activity except as supplementary information (p. 5).

In general then, it may be said that from an operational point of view, the Canadian accounts are completely integrated, the Federal Reserve Board accounts are highly integrated, and the United Nations accounts lack adequate integration.

Conceptual Framework Of Existing Models

Transactions

The Canadian model. With the introduction of the National Transactions Accounts, the Royal Commission stated that "these accounts are built upon the concept of an economic transaction" and that "an economic transaction must be defined as an exchange of equal values as established in

the market place" (Hood, 1958, pp. 467-468). The concept embraces all economic transactions taking place in the economy including purely financial transactions, partly financial and partly nonfinancial transactions and purely nonfinancial transactions. These latter transactions include imputations, payments in kind and barter (pp. 468 and 471).

The Federal Reserve Board model. The Federal Reserve Board states that its model contains "all types of transactions in the economy" (Board of Governors, 1955, p. 2). Elsewhere it states that "the nonfinancial economy is taken to be measured by the scope, definitions, and data of the U. S. income and product accounts published by the Department of Commerce" (Board of Governors, 1975, p. 30). Since the Department of Commerce accounts include imputations, payments in kind and barter, transactions in the Federal Reserve Board flow of funds model may be said to include not only purely financial transactions and those which are partly financial and partly nonfinancial, but also purely nonfinancial transactions including imputations, payments in kind and barter.

Despite statements with respect to the scope of transactions, nowhere does the Federal Reserve Board define the meaning of the term transaction. It does state, however, that the model "records both the payment and the receipt

aspects of any transactions" (1975, p. 2). The payment and receipt aspects of the transaction imply at least two transactors to the transaction, and an exchange. Because of the technical equality of debits (payments) and credits (receipts), the statement implies an exchange of equal value. And because the payment and receipt are recorded, the implication is that the transaction has taken place in the market. In some cases, however, transactions do not involve the exchange of money or claims on money for goods and services, and are not recorded by the transactors. Such transactions include farm produce consumed by the farmer on the farm, the value of board and lodging given to workers in lieu of or in addition to wages, and the rental value of owner-occupied houses. These transactions are recorded in the national income and product accounts on the basis of imputations made by the Department of Commerce, and are reflected in the flow of funds accounts of the Federal Reserve Board.

The United Nations model. Just as the Federal Reserve Board does not define the meaning of the term transaction in its model, so the United Nations omits a definition in its model. However, in discussing the "straightforward accounts" method of presentation the United Nations states that "every transaction must be written down twice, once as an outgoing and once as an incoming; and the description of each transaction must likewise be written down

twice, once in the account of the payer and once in the account of the receiver" (p. 3). The foregoing statement implies that a transaction takes place between at least two transactors (a payer and a receiver), that something is exchanged (outgoing and incoming), and that the exchange takes place in the market (the transaction was recorded). In addition, because of the technical equality of debits and credits, the incoming is equal to the outgoing and therefore, the things being exchanged are of equal value.

The transaction as the basic unit. The Federal Reserve Board states that one of the purposes of its model is to provide aggregate measures of transactions in the economy (Board of Governors, 1975, p. 2). The Canadian model is stated to be built upon the concept of an economic transaction according to the Royal Commission (Hood, 1958, p. 467). For its part the United Nations asserts that in its model attention is focused on those accounts which exhibit the main categories of transactions and aggregates of the system (p. 138).

In each of the three models, accounts have been set up in accordance with the various classifications of transactions. Thus, the accounts distinguish between nonfinancial and financial transactions, current and capital transactions, and transactions in financial assets and liabilities. All transactions in economic resources are recorded in terms

of their exchange price as expressed in units of the national currency. Thus, in all three models, the economic transaction is the basic unit of observation, classification and measurement.

Funds

The microaccounting model. Elsewhere it has been noted that after years of controversy, the term "funds" in microaccounting has been discontinued in favor of the term "resources." The microaccounting model reflects an accounting entity's entire stock of recorded resources. This stock typically consists of nonfinancial and financial resources. The nonfinancial resources include real assets such as land, buildings, machinery and equipment, and intangible assets, while the financial resources consist of financial assets and liabilities.

Financial accountants, however, customarily group a firm's resources into working capital and non-working capital resources. Working capital resources consist of financial and nonfinancial resources that are expected to be converted into cash or used either within a twelve month period or within the normal operating cycle of the accounting entity, whichever is longer, and include cash, accounts receivable, prepaid expenses and inventories. Non-working capital resources are those that are not expected to be converted into cash or used within the time frame of refer-

ence of working capital resources, and consist of land, buildings, machinery and equipment and the balance of the stock of resources.

The Federal Reserve Board model. The Federal Reserve Board does not define the term "funds." However, the Board refers to "net flows of claims" as providing a link between financial markets and nonfinancial activities, and then asserts that "these financial flows are always increments in amounts of assets and liabilities outstanding" (Board of Governors, 1975, p. 7). The Board goes on to state that "economic equilibrium (in any sense of the word) must be a balance simultaneously among stocks, among flows, and between the stocks and flows." By deduction then, since flows consist of changes in amounts of financial assets and liabilities outstanding, and since flows are derived from stocks, it follows that funds in the Federal Reserve Board model consist of stocks of financial assets and liabilities outstanding as at a given moment of time.

The Canadian model. Statistics Canada defines neither funds nor flows. However, in a 1971 progress report to the United Nations, Statistics Canada asserted that "most of the estimates in the financial flow accounts are based on quarter to quarter changes in balance sheet totals for financial assets and liabilities, the statistics for which come largely from direct quarterly questionnaires and

from data filed for administrative purposes" (1971, p. 8). Since balance sheets are stock statements, and since the financial flow accounts are stated to be based on changes in balance sheet totals for financial assets and liabilities, then, by deduction, funds in the Canadian model are a stock of financial resources as at a given moment of time.

The United Nations model. The United Nations model contains two stocks of resources. One is a stock of financial resources consisting of financial assets and liabilities and therefore is similar to the stock of financial resources in the Federal Reserve Board and Canadian models. The other is a stock of nonfinancial resources which is a unique feature of the United Nations model. The stock of nonfinancial resources consists of the undepreciated capital cost of reproducible physical capital such as buildings, machinery and equipment, breeding stock and dairy cattle. Also included in the stock of nonfinancial resources are certain non-reproducible tangible assets such as land which has been purchased, intangible assets such as copyrights and patents, and outlays on improving land and developing mining sites and timber tracts. Excluded from the stock of resources are human resources, and non-reproducible tangible assets such as undeveloped land, mineral deposits and so forth.

The opening and closing stocks of nonfinancial and financial resources, shown as net amounts after depreciation, are contained in the matrix in Table 2.1 of the United Nations recommendations. The purpose of the matrix is to "present the system as a whole without losing sight of its components" (p. 2), and reflects supporting standard accounts. The standard accounts, however, are limited to accounts for flows, and do not contain national and sector balance sheets (p. 138). Moreover, the recommendations fail to lay down guide-lines with respect to stocks incorporated in the matrix.

Flows

The microaccounting model. Conceptually, a flow of resources is derived from a stock of resources, while a stock of resources is a measure of resources as at a given moment of time. Thus, flows and stocks are interrelated, and each depends upon the other, for without stocks there can be no flows, and conversely, without flows there can be no stocks. In the microaccounting model this concept is made operational by periodically measuring the accounting entity's stock of resources. The flow is determined by comparing stock statements (balance sheets) as at two points of time. Emphasis in the model is on the inflows and outflows of resources, and on their interaction between purely working capital resources, purely non-working capital resources, and partly working capital and partly non-working

capital resources. The model is therefore seen to focus on the movement of the accounting entity's stock of resources.

The macroaccounting models. In the three macroaccounting models the concept of a flow has been variously expressed as changes in amounts of assets and liabilities outstanding (Federal Reserve Board model), changes in balance sheet totals for financial assets and liabilities (Canadian model), and economic transactions during a period of account (United Nations model).

In the Federal Reserve Board and Canadian models stocks consist of financial resources comprising financial assets and liabilities. These resources may be observed and measured at given points of time, and in actual practice are for the most part the subject of regular, periodic audit and verification by professional accountants. Since the stock of financial resources may be observed and measured, and since flow is the change in the stock of financial resources between two given points of time, the concept of flow in these two models is an operational one. However, flows are restricted to financial flows and the model is restricted to the interaction of purely financial resources. Because the models lack a stock of nonfinancial resources they fail to depict the interaction that takes place between purely nonfinancial resources on the one hand and partly

nonfinancial and partly financial resources on the other. The information provided by the Federal Reserve Board and Canadian models is therefore incomplete.

In the United Nations model, flow is conceptualized as economic transactions during a period of account (p. 233). Conceptually, given a stock of economic resources, transactions effect a movement of resources which involves inflows into and outflows from that stock. The net change in the stock of resources, then, would be equal to the net transactions in those resources. Thus, whereas the Federal Reserve Board and Canadian models focus on the net change in a given stock of resources, the United Nations model focuses on the net transactions that produced that change.

Unlike the Federal Reserve Board and Canadian models which restrict the scope of their stock of resources to purely financial resources, the United Nations model contains a stock of resources which includes both financial and nonfinancial resources. In this respect the United Nations model resembles the microaccounting model. However, nonfinancial stocks and flows are not interrelated in the matrix in Table 2.1 of the 1968 United Nations recommendations. A distinction is made in the accounts between investment in real assets and investment in financial claims. Investment in real assets reflects economic transactions with respect to fixed capital formation and changes in inventories, is reflected in columns and rows 59 to 68 of the matrix (Table 2.1),

and relates to industries rather than sectors of the economy. However, opening and closing gross stock figures for the accounts are contained neither in the matrix nor in the supporting standard accounts. Investment in financial claims, on the other hand, reflects economic transactions with respect to financial assets and liabilities, is presented in columns and rows 75 to 79 of the matrix, and unlike the capital formation accounts, relates to sectors of the economy. The matrix includes opening and closing stocks of financial assets and liabilities on the one hand, and net real assets on the other.

The main links between the opening and closing stocks of real assets are the capital formation and change in inventory accounts in columns 61 to 68. These are introduced into columns 75 to 79 by means of row 69 which is referred to by the United Nations as a dummy account (p. 26). This use of a dummy account indicates that there is a lack of coherence between nonfinancial stocks and flows in the United Nations model.

The Conceptual Equality of Sources and Uses of Resources

The microaccounting model. Attention has already been drawn to the fact that the microaccounting model contains a stock of nonfinancial and financial resources divided into non-working and working capital resources.

Such a division permits the model to depict the interaction of non-working capital resources with working capital resources as well as interaction between purely non-working capital resources on the one hand and purely working capital resources on the other.

This interaction of resources implies a movement of resources. Conceptually, every movement of resources entails a source of resources and a simultaneous use of resources. A source of resources consists of revenue, increases in liabilities and decreases in assets, while a use of resources consists of expenditures, increases in assets and decreases in liabilities. In the accounts, sources are recorded as credits and uses as debits. Since every source of resources entails a use of resources, and since debits are equal to credits, it follows that sources of resources are conceptually and technically equal to uses of resources. The focus of attention, therefore, in the microaccounting model is on the movement of resources, i.e., on the sources of resources and their simultaneous uses. This concept of movement or flow, however, presupposes a stock of resources, for it is from stocks that flows are derived.

The Federal Reserve Board model. Every transaction in the Federal Reserve Board model involves a receipt and an equal payment. The receipt is referred to as a source of funds and the payment as a use of funds. As in the

microaccounting model, a source of funds is either a decrease in assets, an increase in liabilities, or receipts. Conversely, a use of funds is either a decrease in liabilities, an increase in assets or payments. These receipts and payments are aggregated and netted into balances which represent sector saving, expenditure on real assets, and investment in financial assets. The balances in turn appear in sector statements of sources and uses of funds, and because of the conceptual equality of sources and uses, the statements balance.

However, the Federal Reserve Board has stated that the sector statement is not a traditional sources and uses of funds statement aimed at explaining movements in financial claims. On the contrary, "in the flow of funds context the terms source of funds and use of funds mean no more than the standard terms credit and debit in double-entry bookkeeping" (Board of Governors, 1975, p. 28).

Balances representing an aggregation of receipts and payments in purely nonfinancial transactions, therefore, do not reflect sources and uses of resources. Rather, they represent the dollar magnitude of purely nonfinancial transactions. Conceptually, sources and uses of funds imply a movement or flow of resources, and since there is no stock of nonfinancial resources in the model, there can be no nonfinancial flow. On the other hand, nonfinancial transactions in current goods and services and in real

assets clearly imply a movement of nonfinancial resources and consequently the presence of a stock. The model is therefore incomplete.

Similarly, the Board implies that balances representing an aggregation of receipts and payments in purely financial transactions reflect not sources and uses of financial resources but rather the dollar magnitude of purely financial transactions. However, the Federal Reserve Board model has a stock of financial resources. Conceptually, therefore, every purely financial transaction involves a source of financial resources and a use of financial resources.

Finally, the Board implies that balances representing an aggregation of receipts and payments in transactions that are partly nonfinancial and partly financial reflect the dollar magnitude of those transactions, and not the sources and uses of resources and their interaction. However, since the model contains a stock of financial resources, the financial portion of such a transaction involves either a source or a use of resources.

Conceptually, however, a source of resources implies a simultaneous use of resources and vice versa. Therefore, a transaction which is partly financial and partly nonfinancial involves both financial and nonfinancial resources, and generates a flow which results in either a source of financial resources and a simultaneous use of nonfinancial

resources, or conversely, a use of financial resources and a simultaneous source of nonfinancial resources. Thus, transactions which are partly financial and partly nonfinancial involve sources and simultaneous uses of both financial and nonfinancial resources. Sources and uses of nonfinancial resources, however, imply a stock of nonfinancial resources. Since the model does not contain such a stock, conceptually there can be no sources and uses of nonfinancial resources. An absence of sources or uses of resources in the nonfinancial part of the transaction implies an absence of simultaneous and offsetting uses and sources of resources in the financial part of the transaction, for once again every source of resources involves a use of resources, and vice versa. An absence of financial sources and uses of resources in turn implies the absence of a stock of financial resources which is not so. The model therefore lacks conceptual coherence.

The Canadian model. Statistics Canada has avoided use of such terms as "sources and uses" and "receipts and payments." The Royal Commission observed that "commonly the terms 'uses' and 'sources' of funds have been employed in this type of accounting system, but the more neutral terms debit and credit seem preferable." The Royal Commission went on to state that "accounts for this type do not conform strictly to the statement of uses and sources of

funds employed in business accounting, and somewhat different conventions govern them" (Hood, 1958, p. 480). Thus, in the Canadian accounts every transaction involves a debit and a simultaneous and equal credit. Debit entries record purchases of goods and services, increases in assets and decreases in liabilities, while credits record sales, decreases in assets and increases in liabilities. However, the terms debit and credit are merely substitutes for the terms payments and receipts used in the Federal Reserve Board model, and the same deficiencies that exist in that model with respect to sources and uses of resources are inherent in the Canadian model. However, the Canadian model does not have a stock of nonfinancial resources. Consequently, the model reflects sources and uses of financial resources in purely financial transactions, and in the financial portion of transactions which are partly financial and partly nonfinancial, but fails to reflect sources and uses of resources in transactions affecting nonfinancial resources. The Canadian model therefore, is incomplete and lacks conceptual coherence.

The United Nations model. This model uses the terms incomings and outgoings to denote what is referred to in the Federal Reserve Board model as receipts and payments, and in the Canadian model as debits and credits. Thus, incomings are receipts (credits) and outgoings are payments (debits).

Unlike the other two models, the United Nation's model has a stock of resources containing both financial and nonfinancial resources. The standard accounts, however, do not contain stock statements, and the nonfinancial stocks appearing in the matrix are not related to nonfinancial flows. The model therefore demonstrates sources and uses of resources in purely financial transactions, but because of the lack of coherence between nonfinancial stocks and flows in the model, it fails to demonstrate the sources and uses of resources in purely nonfinancial transactions, and in the nonfinancial part of partly nonfinancial and partly financial transactions.

The Conceptual Equality of Saving and Investment

In the existing models, all transactions are eventually netted into three balances: saving, investment in real assets, and investment in financial assets. Saving is variously defined as the excess of receipts over payments (Federal Reserve Board model), the excess of credits over debits (Canadian model), and the excess of inflows over outflows (United Nations model). Since receipts in the Federal Reserve Board model and inflows in the United Nations model are recorded as credits, it follows that saving in all three models is a credit balance.

Similarly, investment in physical capital and in financial assets is the excess of payments over receipts in

the Federal Reserve Board model and the excess of outflows over inflows in the United Nations model. Since payments or inflows in these models are debits, it follows that balances representing net investment in real assets and balances representing net investment in financial assets are debit balances.

Because of the technical equality of debits and credits, the credit balance representing saving implies offsetting debits. These debits are to be found in the balances reflecting increases in real assets, increases in financial assets and decreases in liabilities. These balances represent investment. Since total credits equal total debits, and since saving is a credit balance and investment is a debit balance, it follows that saving is equal to investment.

Receipts which represent returns to the factors of production, transfer payments, and so forth are sources of resources. Similarly such transactions as payments to factors of production and transfer payments are uses of resources. The excess of sources over uses of resources represents saving and as already shown is a credit balance. Similarly, payments with respect to fixed capital formation, net payments for existing real assets and payments relating to loans are uses of resources, represent investment and are recorded as debits. Thus, investment is a use of resources while saving is a source of resources. However, conceptually,

sources of resources are equal to uses of resources, and technically debits are equal to credits. Therefore, conceptually as well as technically, saving is equal to investment.

Because of the conceptual equality of saving and investment, if a sector invests all of its saving in nonfinancial resources, the implication is that it has neither loaned resources to other sectors nor has it borrowed resources from other sectors. However, a sector may invest less in nonfinancial resources than it saves in which case, because of the conceptual equality of saving and investment, the implication is that it has made its excess resources available to finance economic activity in other sectors. Similarly, a sector may save less than it invests in nonfinancial resources in which case it has borrowed resources from other sectors.

A sector that invests less in nonfinancial resources than it saves is referred to as a surplus sector. Conversely, a sector that invests more than it saves is referred to as a deficit sector. Because of the conceptual and technical equality of saving and investment, the existence of a surplus sector implies the existence of a deficit sector. Furthermore in order to maintain the equality of saving and investment, a surplus sector must lend or repay debts in an amount equal to the excess of saving over investment in nonfinancial resources.

Net lending by a surplus sector is done by way of debt and equity instruments and represents that sector's investment in financial resources. However, one sector's financial assets is another's liabilities and hence any lending by a surplus sector must be offset by borrowing by one or more deficit sectors to finance investment in nonfinancial resources. A deficit sector for its part implies the existence of a surplus sector. Once again, in order to maintain the conceptual and technical equality of saving and investment, the deficit sector must borrow from surplus sectors an amount which is equal to the excess of its investment in nonfinancial resources over its saving.

Net borrowing by a deficit sector is done by way of debt and equity instruments and represents the amount of debt incurred by the sector in the process of investing in nonfinancial resources in excess of its saving. However, one transactor's liabilities are another's assets so that borrowing must be offset by one or more surplus sectors that have loaned financial resources to enable the deficit sector to satisfy its investment needs in nonfinancial resources. This borrowing represents disinvestment, and together with investment in nonfinancial resources is equal to saving.

Depreciation

The Microaccounting model. In the microaccounting model, real assets are conceptualized as consisting of a bundle of services which generate a stream of revenue over the expected useful life of the assets. Depreciation is a process of cost allocation which aims to distribute the cost of those assets (less any salvage value) over their estimated useful life in a systematic and rational manner. This allocation is recorded in the accounts by means of internal bookkeeping entries.

The three macroaccounting models. In the Federal Reserve Board and Canadian models, the basis of valuation used in estimating depreciation charges is mainly the original capital cost of assets. The basis of allocation of those costs, in turn, is over the estimated useful life of the assets. As in the microaccounting model, depreciation is recorded by means of internal bookkeeping entries. The United Nations model refers to depreciation as a flow which is "based on the concept of the expected economic lifetime of the individual assets" (p. 122). In this model, asset costs are written off on a straight-line basis over the useful life of the assets. As in all of the other models, depreciation is recorded internally.

In general, depreciation in all three macroaccounting models is not a process of asset valuation. Rather, it is an allocation of the cost of assets over their estimated useful lives. All three macroaccounting models are built

upon the concept of an economic transaction in which one economic resource is exchanged for another. Depreciation, however, does not represent the result of such an economic transaction. Instead, it reflects the gradual write-off of capital acquisition incurred in prior accounting periods and as such does not constitute an internally consistent part of the three models. Moreover, since depreciation is based upon the allocation of capital costs over the estimated useful life of the assets involved, the concept of depreciation implies the existence of a stock of real assets. However, neither the Federal Reserve Board nor the Canadian models have a stock of real assets, and the concept therefore does not constitute a coherent or logical part of these two models. Nor does the concept constitute a coherent part of the United Nations model, for the write-off of prior period costs is related to neither stocks representing nonfinancial resources nor flows representing economic transactions.

Assumptions Implicit
In Existing Models

The Federal Reserve Board, Canadian and United Nations models contain a number of implicit assumptions. These assumptions are as follows:

1. Transactors possess readily identifiable characteristics with respect to economic activity, be-

havior, and so forth, which enables them to be classified into a relatively small number of groups. This is implied from the fact that in each of the models transactors are grouped on a stated basis into households, business, government and the rest of the world.

2. The models operate in a free enterprise system. This is implied from the magnitude of transactions in the non-government sectors. These transactions in turn imply private ownership of a large part of the economy's goods and services, and freedom by private individuals and groups to buy and sell these goods and services.

3. The basic unit of observation, classification and measurement is the economic transaction. This is implied in that in all three models the focus of attention is the transaction, the accounts for each sector are a system of classification of transactions, and measurements are recorded and reported in terms of the prices at which economic goods and services were exchanged in the course of economic transactions.

4. Transactions relate to economic goods and services. The term economic implies that the goods are owned by someone, are scarce, and possess utility and transferability. The assumption is implied from the quadruple-entry system of accounting which is based on the participation of at least two transactors, and from the concept of a transaction which involves an exchange of one thing for another between two or more transactors.

5. Every transaction involves a receipt and a payment on the one hand, and an exchange of equal value on the other. This is implied from the nature of the accounts which record a receipt and an equal payment for each participant in an economic transaction.

6. Economic goods and services exclude tangible and intangible natural resources. This is implied by the exclusion of transactions categories for such resources as rivers, waterfalls, undeveloped mineral deposits, human resources, climate, and so forth.

7. The standard unit of measurement is the basic unit of money and is stable. Money as the

standard unit is implied by the fact that the magnitude of transactions and the stock of resources is expressed in United States dollars in the Federal Reserve Board model, in Canadian dollars in the Canadian model, and in the neutral term "units of value" in the United Nations model since the recommendations are applicable to any country. Stability is implied from the fact that none of the models distinguish between price changes due to changes in market forces and price changes due to inflation or deflation.

8. Economic transactions are identified and reported in terms of specific periods of equal length and regularity. This is implied by the quarterly and annual flow statements published by the Federal Reserve Board and Statistics Canada.

Illustration Of The Three Macroaccounting Models

The analysis in this chapter reveals that the Federal Reserve Board and Canadian flow of resources models are essentially identical, and that any differences between them are to be found in the extent to which they are integrated

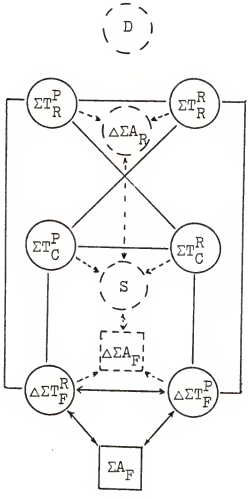

Figure 1. The Federal Reserve Board And Canadian Model

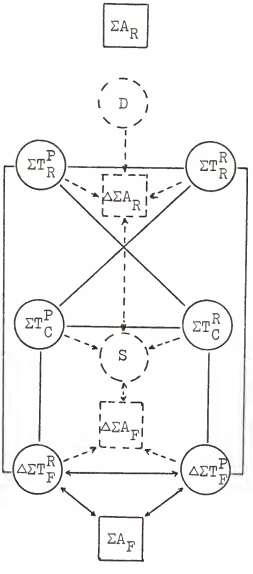

Figure 2. The United Nations Model

Table 1

Summary of Symbols Used
In Figures 1 and 2

Basic symbols

T	=	Transaction
A	=	Asset
L	=	Liability
S	=	Saving
I	=	Investment
D	=	Depreciation
S^r	=	Source of resources
U^r	=	Use of resources
DR	=	Debit
CR	=	Credit
t	=	Time
Σ	=	Aggregate
Δ	=	Change

Superscripts

R	=	Receipt
P	=	Payment

Subscripts

C	=	Current
R	=	Real asset
F	=	Financial claim
f	=	Financial asset
L	=	Liability
S	=	Saving
I	=	Investment
pos	=	Positive
neg	=	Negative

Other Symbols

 = Stock

 = Change in stock

 = Transaction

 = Depreciation or a balance that emerges as a result of netting aggregates.

 = Connection of the receipt and payment aspect of a single economic transaction.

 = Flow

 = Emergence of a balance or change. Also denotes relationship between net balances.

with the national income accounts. Accordingly, Figure 1 illustrates both the Federal Reserve Board and Canadian models. Figure 2 illustrates the United Nations model. Table 1 contains a summary of the symbols used in the models, and in the notations that follow.

Each of the three models may be expressed in abstract symbols as follows.

In any economic transaction

$$T^R = T^P$$

In a purely financial transaction

$$T_F^R = T_F^P$$

$$T_F^R = S_F^r$$

$$T_F^P = U_F^r$$

$$S_F^r = U_F^r$$

In a purely nonfinancial transaction

$$T_C^R = T_C^P, \text{ but } S_C^r \neq U_C^r$$

$$T_R^R = T_R^F, \text{ but } S_R^r \neq U_R^r$$

$$T_C^R = T_R^P, \text{ but } S_C^r \neq U_R^r$$

$$T_R^R = T_C^P, \text{ but } S_R^r \neq U_C^r$$

In a transaction which is partly financial and partly non-financial

$$T_F^R = T_R^P, \text{ but } S_F^r \neq U_R^r$$

$$T_F^R = T_C^P, \text{ but } S_F^r \neq U_C^r$$

$$T_C^R = T_F^P, \text{ but } S_C^r \neq U_F^r$$

$$T_R^R = T_F^P, \text{ but } S_R^r \neq U_F^r$$

For any one sector

1. $\Sigma A_F = \Sigma A_f + \Sigma L$

2. $\Sigma T^P_{F(pos)} = (\Sigma T_F^P - \Sigma T_F^R)_{pos}$ when $\Sigma T_F^P > \Sigma T_F^R$

$= \Delta\Sigma A_f$

$\Sigma T^R_{F(neg)} = (\Sigma T_L^R - \Sigma T_L^P)_{neg}$ when $\Sigma T_L^R > \Sigma T_F^P$

$= \Delta\Sigma A_L$

$\Delta\Sigma A_F = \Delta\Sigma A_f + \Delta\Sigma A_L$

3. $\Sigma T_C^R - \Sigma T_C^P = S$

$S = S_{neg}$ when $\Sigma T_C^R > \Sigma T_C^P$ (Saving)

$S = S_{pos}$ when $\Sigma T_C^R < \Sigma T_C^P$ (Dissaving)

4. $\Sigma T_R^P - \Sigma T_R^R = I_R$

$I_R = I_{R_{(pos)}}$ when $\Sigma T_R^P > \Sigma T_R^R$ (Investment)

$I_R = I_{R_{(neg)}}$ when $\Sigma T_R^P < \Sigma T_R^R$ (Disinvestment)

5. $\Sigma T_F^P - \Sigma T_F^R = I_F$

$I_F = I_{f_{(pos)}}$ when $\Sigma T_F^P > \Sigma T_F^R$ (Investment)

$I_F = I_{f_{(neg)}}$ when $\Sigma T_F^P < \Sigma T_F^R$ (Disinvestment)

6. $DR = CR$

$S_{neg} = CR$

$(I_R + I_F)_{pos} = DR$

$S_{neg} = (I_R + I_F)_{pos}$

7. $S_{pos} = DR$

$(I_R + I_F)_{neg} = CR$

$S_{pos} = (I_R + I_F)_{neg}$

8. $\Sigma R = \Sigma P$

9. $\Sigma S_{neg} = \Sigma S_{pos}$

10. $(\Sigma I_R + \Sigma I_F)_{pos} = (\Sigma I_R + \Sigma I_F)_{neg}$

11. $\Sigma S = \Sigma I$

12. $\Sigma A_f = \Sigma L$

13. $\Sigma A_F = \Sigma A_f + \Sigma L$

$= 0$

However, in the Federal Reserve Board and Canadian models:

1. $\Sigma A_R = 0$

2. Technically,

$DR = CR$

$CR = S$

$DR = I$

$\therefore S = I$

Conceptually,

(a) $S_S^r = U_I^r$

$S_S^r = S$

$U_I^r = I$

$S = I$

(b) $I = I_F + I_R$

$U_I^r = U_F^r + U_R^r$

$U_R^r = 0$ because $\Sigma A_R = 0$

But

$$I_R \neq 0$$

$$\therefore U_I^r \neq I$$

Also, since

$$I = S$$

$$\therefore S_S^r \neq U_I^r$$

Summary and Conclusions

The primary purpose of the Federal Reserve Board, Canadian and United Nations flow of resources models has been generally described to be to provide aggregate measures of economic transactions. The uses made of the information thus provided include analysis, forecasting and decision-making. The three models were found to contain implied assumptions with respect to the characteristics of transactors, the economic environment in which the models operate, the basic unit of observation, classification and measurement, and periodicity. Associated with the models were also a number of expressed or implied concepts. These included transaction, funds, flows, the equality of sources and uses of resources and the equality of saving and investment.

All three models were found to be deficient. The Federal Reserve Board, Canadian and United Nations models

lack coherence. In addition, the Federal Reserve Board and Canadian models are incomplete, while the United Nations model is complete but lacks adequate integration of accounts. As a consequence, doubts may be expressed about the accuracy and completeness of the information which the models provide for the purposes of analysis, forecasting and decision-making.

What is required is an improved model which is more coherent and more complete. It is hypothesized that a model based on the observation, classification and measurement of economic objects rather than of the magnitude of economic transactions will provide an improved model. Such a model is developed in the next chapter.

CHAPTER IV

THE PROPOSED FLOW OF RESOURCES MODEL

The purpose of this chapter is to develop a flow of resources model that is an improvement over the existing Federal Reserve Board and Canadian models. The first step will be to set forth a number of postulates to describe the conditions under which the model will be built, and to afford the model stability. Theoretical constructs will then be formulated to provide the model with a theoretical frame of reference for subsequent operations, and operational constructs will be added to connect the theoretical constructs to the empirical world.

Throughout the process of building the model, the emphasis will be on developing a structure which is coherent, internally consistent and operational, and contains features which permit integration with national income and product accounts and input-output tables.

Postulates

The postulates which follow serve two purposes. The first purpose is to describe the conditions under which the

model will be built. The second is to stabilize the model so that it will not be affected by variables other than the ones under consideration.

The selection of the postulates has been guided by observations made in the previous chapter with respect to the implied assumptions in the existing three models and the socioeconomic environment in which the Federal Reserve Board and Canadian models operate. Thus, implied assumptions relevant to the proposed model have been selected, those which were considered to be irrelevant have been discarded, and new postulates have been formulated. The postulates are as follows.

P 1. The sector is a relatively homogeneous group of transactors who possess readily identifiable characteristics with respect to economic activity and behavior.

P 2. Economic objects possess readily identifiable characteristics which enable them to be classified into homogeneous groups.

P 3. The model operates in a free-enterprise system.

P 4. The accounting entity is the sector.

P 5. The movement of economic objects is the result of economic activity. Economic activity consists

of the production, consumption and exchange of economic objects. Exchange involves the disposition of an economic object and the simultaneous acquisition of a different economic object.

P 6. The standard unit of measure is the basic unit of national currency, and is stable.

P 7. The economic object is the basic unit of observation, classification and measurement.

P 8. Economic units are classified and counted at regular periodic intervals of equal length.

P 9. The value of the stock of economic objects is equal to the sum of the value of all its parts.

Theoretical Constructs

In order to be able to identify and define, in a precise manner, the objects to be measured, it will be necessary to first formulate a set of theoretical constructs which possess the characteristics of purity and exactness, and provide the model with a theoretical frame of reference for subsequent operations.

The Theoretical Constructs

The theoretical constructs are presented in the form of a set of nominal definitions consisting of a definiendum and a definiens, and are as follows.

TC 1. The economic object = Df the economic resource.

TC 2. The sector = Df the entity possessing one or more economic objects, and capable of engaging in economic activity.

TC 3. The stock of economic resources = Df the aggregate of economic objects possessed by the sector as at a given point of time.

TC 4. The flow of economic resources = Df the change in the stock of economic resources between two given points of time.

TC 5. The value of the economic object as at a given point of time = Df the present value of the future revenue stream of the economic object.

The Logical Connectivity
Of the Theoretical Constructs

In order for the model to be coherent and internally consistent, it is essential to demonstrate that the theoretical constructs possess logical connectivity. This may be shown in the following manner for a given sector.

Let O_E = The economic object

R = The stock of economic resources

T^S = The sector

ΔR = The change in the stock of economic resources

T^S_{pos} = The sector possesses

t = A given point of time

Σ = Aggregate

Then $T^S_{pos} = R$ (1)

$R = \Sigma O_E$ (2)

$\Delta R = \Delta \Sigma O_E$ (3)

$\Delta \Sigma O_E = \Sigma O_{E(t_2)} - \Sigma O_{E(t_1)}$ (4)

Properties of the Constructs

The ultimate purpose of the foregoing theoretical constructs is that they function in subsequent operations. However, any ambiguity in the meaning of the terms contained in the definiens may lead to inaccurate thinking, confusion and misunderstanding in subsequent operations. Therefore, in order to have a clear understanding of the characteristics, functions and logical relationships of the terms used in the constructs, it will be necessary to draw out the specific properties of the definiens and their relationships as follows.

The economic resource. The term economic implies that the resource is owned by someone, is scarce, and possesses utility and transferability. Another property of the economic resource is that it possesses characteristics which permit it to be classified as either a physical object or a financial object.

A physical object may be a real asset, a tangible natural resource endowment, or an intangible natural resource endowment; it is owned by a transactor and is not someone else's liability. A financial object is one that is owned by a transactor, is a financial instrument that facilitates the exchange of physical objects, consists of either financial assets or liabilities, and is some other transactor's liability or financial asset respectively.

The entity. By assumption, the entity consists of a relatively homogeneous group of transactors. The transactor may be a person, a sole proprietorship, a partnership or a corporation and possesses readily identifiable characteristics with respect to economic activity and behavior.

The aggregate of economic objects. Conceptually, the aggregate of economic resources encompasses all those parts of the universe that have been appropriated to the use of man. This includes physical objects such as real assets, tangible and intangible natural resource endowments, and financial objects such as financial assets and liabilities.

Real assets are those that appear only on the balance sheet of their owners and consist of tangible and intangible assets. Tangible assets include land, buildings, machinery and equipment, and business inventories comprising raw materials, work in process and finished goods. Also included in tangible assets are personal items such as dwellings, automobiles and furniture. Intangible assets include patents, copyrights, franchises and licenses.

Financial assets are of two kinds, reciprocal and real. Reciprocal financial assets include such financial instruments as cash, accounts receivable, notes receivable, and securities such as corporate stocks, bonds and mortgages. For the nation as a whole these assets are offset by financial liabilities. Real financial assets on the other hand

are accounts receivable from the rest of the world and for the nation as a whole are not offset by financial liabilities.

Similarly, liabilities consist of reciprocal liabilities and real liabilities. Reciprocal liabilities include accounts payable, notes payable, bonds payable, mortgages payable and capital stock, and for the nation as a whole are offset by reciprocal financial assets. Thus, a transactor's reciprocal liabilities are another's reciprocal financial assets and vice versa, and consequently for the nation as a whole the two net out to zero. Real liabilities, however, are accounts payable to the rest of the world, and for the nation as a whole are not offset by financial assets. For the balance of this study, reciprocal financial assets will be referred to simply as financial assets, and reciprocal liabilities as simply liabilities.

Tangible natural resource endowments include land, forests, minerals, and water resources such as rivers, lakes, waterfalls and coastal waters. Intangible resources comprise human resources including the capital element of health and education, climate including such factors as sunshine, precipitation and temperature, and geographical features.

There are, however, statistical difficulties associated with measuring tangible and intangible natural resource endowments. Since such assets as climate and geographical features cannot be traded on the market, no market price exists. Since they are a gift of nature, there is no original

cost. By virtue of their intrinsic nature, replacement cost is not applicable. And since the earning power of these resources cannot be calculated, capitalized earning power as a basis of valuation is inappropriate.

Insofar as human resources are concerned, suggestions concerning their valuation have been made at both the micro and macroaccounting level. The bases of valuation noted by the American Accounting Association include historical cost, replacement cost and discounted future earnings (Supplement, 1973, pp. 171-174). However, the American Accounting Association also observed that statistical data on human resources are unavailable since only a few corporations have pioneered the development and implementation of accounting for investments in such resources, and research to demonstrate the feasibility of human resource accounting is still at a relatively primitive stage (1973, p. 124).

Other natural resource endowments such as virgin land, forests, minerals, water, and so forth, are equally difficult to measure and value. The physical dimensions of a great deal of these resources can only be guessed at, and even where they can be surveyed in physical terms, a great deal of difficulty arises in assigning meaningful values to them.

Land, for example, is relatively easy to value in inhabited areas where there is an active market in real estate, but the assignment of values to enormous tracts of public lands, particularly in the remote regions of a nation, pre-

sents obvious problems. Known oil, gas and mineral deposits also present problems of valuation, for prior to production, large amounts have to be spent on development and the end result is seldom certain. The valuation of water, forests and wildlife is no less difficult.

Because of the statistical difficulties associated with measuring and valuing tangible and intangible natural resource endowments, their inclusion in the proposed model would render it nonoperational. Therefore, for practical reasons, they will have to be excluded, and the scope of the model will have to be restricted to real assets, financial assets and liabilities.

The present value of future earnings of the economic object. The value of an economic object is the present value (discounted amount) of its future revenue stream. In order to determine the present value, the following information is required:

R_t = The revenue generated by the economic object during time period t.

i = The opportunity rate of interest.

n = The number of years of service life of the economic object.

Given that V_0 = the present value at the beginning of time period t_1, then the discounted amount of the future revenue stream of an economic object may be determined by means of the following formula:

$$V_0 = \sum_{t=1}^{n} \frac{R_t}{(1+i)^t} \qquad (5)$$

This conceptual approach to valuation is particularly applicable to financial objects where the future revenue stream is known as in the case of fixed interest-bearing mortgages, the waiting period for conversion into cash is relatively long, and/or the stipulated interest rate is different from the current market (opportunity) rate of interest for financial instruments of similar quality. Examples of financial objects suited for the present value basis of valuation include long-term notes, loans and advances, and fixed interest-bearing mortgages, bonds and debentures.

For most other types of economic objects, however, this method of valuation is not operational because the method requires a knowledge of an object's future revenue stream, and since the future is uncertain, future receipts and disbursements cannot be projected with certainty. Therefore, in order for the model to be operational, other bases of valuation must be used which approximate the conceptual approach. These other bases include current market prices, replacement cost, reproduction cost, face value, book value and liquidation prices.

When a transactor purchases an economic object in the market, he will be guided in the price which he pays for it by the revenue stream that he expects from it. The current market price of such an object is therefore a close approximation to the conceptual approach. The extent to which different economic objects can be valued at market will obviously depend on the scope of the market for the objects being valued. In general, market prices may be used for such physical objects as inventories of raw materials and finished goods, securities held as investments and normally traded on stock exchanges, family dwellings, certain consumer durables such as automobiles, and agricultural land.

For many economic objects, however, there is no active market which will provide current market prices. In such instances replacement cost may be used and will provide a basis of valuation which closely approximates current market prices. Using the replacement cost basis, economic objects may be valued on the basis of similar or related objects for which current market prices do exist. This basis would be appropriate for many consumer durables, machinery and equipment, and securities not traded on stock exchanges.

Another basis of valuation that approximates current market prices and hence the conceptual approach is reproduction cost. Under this method one would estimate the quantity of each of the inputs required to produce an object similar to the one being valued, price the total inputs on the basis

of current market prices, and from the result deduct an estimated amount for the service potential of the appraised object which has expired. This approach would be particularly appropriate for certain types of commercial, industrial and government buildings where current market and replacement cost cannot be used.

A number of other valuation bases exist which approximate the conceptual approach in appropriate circumstances. The first is face value in the case of cash and short-term claims such as accounts receivable and accounts payable. The second is book value in the case of intangibles such as organization costs, copyrights, trademarks and patents. The third is current market value less cost of inputs to complete in the case of work in process. The fourth is liquidation prices in the case of economic objects which have lost their normal usefulness, have become obsolete, or are no longer marketable.

Thus, a number of different valuation bases may be used which approximate discounted future revenue, and are summarized in Table 2. For those economic objects for which the suggested valuation bases are not available, historical cost may be used as the closest available approximation of the conceptual approach.

Table 2

Valuation Bases

Economic Object	Approximation To Present Value
Financial objects	
Cash, short-term accounts receivable and payable, short-term notes, loans and advances	Face value
Investments in shares of capital stock traded on the stock exchange	Current market price
Investments in shares of capital stock not traded on the stock exchange	Replacement cost or book value
Bonds, mortgages and debentures	Present value
Physical objects	
Inventories	Current market price
Obsolete inventory, scrap	Liquidation price
Land	Current market price
Commercial, industrial and government buildings	Reproduction cost
Family dwellings	Market price
Machinery and equipment	Replacement cost
Automobiles and consumer durables	Current market price or replacement cost
Intangibles	Book value

Operational Constructs

The identification of the properties of the theoretical constructs has served to draw out their operational capacity. These properties may now be formalized into a set of operational constructs which will set forth their operative capacity for subsequent manipulations, and thereby connect the theoretical constructs to the empirical world. The model contains a total of eleven operational constructs. The first nine relate to classification, and the balance to measurement.

Classification

Objects. The first three operational constructs relate to the classification of objects.

OC 1. Economic objects consist of physical objects and financial objects.

Conceptually, a stock of economic resources (R) consists of economic objects (O_E). Since economic objects consist of physical objects (O_P) and financial objects (O_F), then the following relationships exist.

$$R = \Sigma O_E \quad \text{(From 2)}$$

$$\Sigma O_E = \Sigma O_P + \Sigma O_F \qquad (6)$$

In addition, however,

Since $\Delta R = \Delta\Sigma O_E$ (From 3)

Then $\Delta\Sigma O_E = \Delta\Sigma O_P + \Delta\Sigma O_F$ (7)

Moreover,

Since $\Delta\Sigma O_E = \Sigma O_{E(t_2)} - \Sigma O_{E(t_1)}$ (From 4)

Then $\Delta\Sigma O_P = \Sigma O_{P(t_2)} - \Sigma O_{P(t_1)}$ (8)

And $\Delta\Sigma O_F = \Sigma O_{F(t_2)} - \Sigma O_{F(t_1)}$ (9)

There is, therefore, a logical relationship between the theoretical constructs reflected in the first four relationships, and the operational constructs reflected in the latter four relationships.

OC 2. Physical objects are classified according to their physical properties and appearance.

Each sector will possess a range of different types of physical objects. The complete range of types of physical objects for a given sector may be expressed as follows:

$$O_1, O_2, \ldots, O_j \quad (10)$$

In addition, a second subscript may be assigned to a given type of physical object to identify individual physical ob-

jects possessing common physical properties and appearances. The following relationships will therefore hold:

1. The aggregate of physical objects having properties common to O_1 is:

$$\Sigma O_1 = O_{11} + O_{12} + \ldots + O_{1n_1} \qquad (11)$$

2. Similarly, the aggregate of physical objects having properties common to O_2 is:

$$\Sigma O_2 = O_{21} + O_{22} + \ldots + O_{2n_2} \qquad (12)$$

3. Finally, the aggregate of physical objects having properties common to the final type of object O_j is:

$$\Sigma O_j = O_{j1} + O_{j2} + \ldots + O_{jn_j} \qquad (13)$$

4. For the sector as a whole, the aggregate stock of physical objects may therefore be expressed as:

$$\Sigma O_P = \Sigma O_1 + \Sigma O_2 + \ldots + \Sigma O_j \qquad (14)$$

and may be presented in disaggregated form as:

$$\begin{aligned} \Sigma O_1 &= O_{11} + O_{12} + \ldots + O_{1n_1} \\ \Sigma O_2 &= O_{21} + O_{22} + \ldots + O_{2n_2} \\ &\vdots \\ \Sigma O_j &= O_{j1} + O_{j2} + \ldots + O_{jn_j} \end{aligned} \qquad (15)$$

OC 3. Financial objects are classified by type of financial instrument.

Since financial objects (O_F) consist of financial assets (A_F) and liabilities (L), the following relationship exists.

$$\Sigma O_F = \Sigma A_F + \Sigma L \tag{16}$$

Financial assets may be classified by type of instrument as follows:

$$A_1, A_2, \ldots, A_a \tag{17}$$

In addition, a second subscript may be assigned to a given type of instrument to identify individual financial assets possessing common properties. Thus, following the approach used in classifying physical objects, for the sector as a whole, the aggregate stock of financial assets may be expressed as:

$$\Sigma A_F = \Sigma A_1 + \Sigma A_2 + \ldots + \Sigma A_a \tag{18}$$

and may be presented in disaggregated form as:

$$\begin{aligned}
\Sigma A_1 &= A_{11} + A_{12} + \ldots + A_{1n_1} \\
\Sigma A_2 &= A_{21} + A_{22} + \ldots + A_{2n_2} \\
&\vdots \\
\Sigma A_a &= A_{a1} + A_{a2} + \ldots + A_{an_a}
\end{aligned} \tag{19}$$

Similarly, the aggregate stock of liabilities for the sector may be expressed as:

$$\Sigma L = \Sigma L_1 + \Sigma L_2 + \ldots + \Sigma L_k \qquad (20)$$

and may be presented in disaggregated form as:

$$\begin{aligned} \Sigma L_1 &= L_{11} + L_{12} + \ldots + L_{1n_1} \\ \Sigma L_2 &= L_{21} + L_{22} + \ldots + L_{2n_2} \\ &\vdots \\ \Sigma L_k &= L_{k1} + L_{k2} + \ldots + L_{kn_k} \end{aligned} \qquad (21)$$

Thus, from (14), ΣO_P represents the aggregate of individual physical objects; from (18) ΣA_F represents the aggregate of individual financial assets; and from (20), ΣL represents the aggregate of individual liabilities. However,

From (16), $\Sigma A_F + \Sigma L = \Sigma O_F$

From (6), $\Sigma O_P + \Sigma O_F = \Sigma O_E$, and

From (2), $\Sigma O_E = R$

Economic Activity. The next five operational constructs relate to the classification of economic activity.

OC 4. Change in the stock of physical and financial objects is the result of economic activity.

OC 5. Economic activity involving physical objects consists of production of physical objects, consumption of physical objects, and exchange of physical objects.

In operational construct OC 5, the production of physical objects is a transformation process in which there is a simultaneous input and output of physical objects. The number of units of output may be equal to, greater than or less than the number of units of input. Examples of the transformation process associated with production are numerous and commonplace and will be afforded no further comment here.

The consumption of physical objects is an extinction process involving an input of physical objects with no related output of physical objects. Any physical object which loses the usual characteristics associated with an economic object such as utility and scarcity would be considered to have been consumed. An example of the consumption of a physical object is the complete exhaustion of the service capacity of a machine.

The exchange of physical objects is a trading process. In this type of activity there is an acquisition of a physical object and a simultaneous disposition of a physical object. Examples include the exchange of land for a building, a boat for an automobile, and a hammer for a saw.

OC 6. Economic activity involving financial objects consists of production of financial objects, consumption of financial objects, and exchange of financial objects.

For any one transactor, the production of financial objects is a process whereby a financial asset or liability is created. Examples include the setting up of an account receivable upon the sale of a physical object, the setting up of an account payable upon the purchase of a physical object, and the issue of shares of capital stock in a corporation. The production of a financial asset or liability by a transactor always involves a second transactor who produces an offsetting liability or financial asset, for one transactor's financial asset is another's liability, and vice versa.

The consumption of a financial object for any one transactor is a process in which a financial asset or a liability becomes extinct. Examples include the forgiveness of a loan and the discharge of a debt. The consumption of a financial asset or a liability by a transactor always involves a second transactor who consumes an offsetting liability or financial asset, for once again, the financial asset of one transactor is the liability of another, and conversely.

Finally, the exchange of financial objects is a conversion process. In this case a financial object is traded for another financial object. Examples of this type of

economic activity include the exchange of an account receivable for a note receivable, and bonds payable for shares of capital stock.

OC 7. For any two sectors involved in the exchange of an economic object, the disposition of the object by the one sector constitutes a source of economic objects, and the acquisition of that object by the other sector constitutes a use of economic objects.

OC 8. For any one sector, the disposition of an economic object for some other economic object constitutes a source of economic objects, and the acquisition of the other economic object in exchange constitutes a use of economic objects.

Since every exchange involves a source (S_E) and a simultaneous use (U_E) of economic objects, it follows that the sources of economic objects generated by exchange activity are equal to their uses. For accounting purposes, a source of economic objects is recorded as a credit (CR), and a use as a debit (DR). This relationship may be expressed as:

$$U_E = DR$$

$$S_E = CR$$

$$\text{Since } U_E = S_E$$

$$\text{Then } DR = CR$$

Since economic objects (O_E) consist of physical objects (O_P) and financial objects (O_F), it follows that the exchange of economic objects (E_E) involves the exchange of either physical objects (E_P), financial objects (E_F), or both. Thus,

$$E_E = E_P + E_F \tag{22}$$

In the same manner, a source of economic objects (S_E) may involve either a source of physical objects (S_P), a source of financial objects (S_F), or both, and therefore

$$S_E = S_P + S_F \tag{23}$$

Similarly, a use of economic objects (U_E) may involve either a use of physical objects (U_P), a use of financial objects (U_F), or both, and hence

$$U_E = U_P + U_F \tag{24}$$

However, once again, sources of economic objects are equal to uses of economic objects and thus

$$S_E = U_E, \text{ or} \tag{25}$$

$$S_E - U_E = 0 \tag{26}$$

Since an exchange of an economic object between two sectors involves a decline in the stock of economic objects (a source of economic objects) for the one sector, and a

corresponding and simultaneous increase in the stock of economic objects (a use of economic resources) for the other sector, the effect of the transaction on the total stock of economic objects for the two sectors is zero. This may be expressed as:

$$E_E = S_E - U_E$$
$$= 0 \qquad (27)$$

Similarly, the following relationships also hold:

$$E_P = S_P - U_P$$
$$= 0 \qquad (28)$$

$$E_F = S_F - U_F$$
$$= 0 \qquad (29)$$

Operational constructs OC 4, OC 5, OC 6, OC 7 and OC 8 form part of a coherent system of ideas in the model. This may be demonstrated in the following way:

Let P_P = Production of physical objects
C_P = Consumption of physical objects
E_P = Exchange of physical objects
P_F = Production of financial objects
C_F = Consumption of financial objects
E_F = Exchange of financial objects

t = Time

S_P = Source of physical objects

U_P = Use of physical objects

S_F = Source of financial objects

U_F = Use of financial objects

Assuming for the moment that all exchange activity is confined to physical objects, then for any one sector of an economy the change in the stock of physical objects between two given points of time may be expressed by the following relationships:

$$\Sigma O_{P(t_1)} + \Sigma P_P + \Sigma E_P - \Sigma C_P = \Sigma O_{P(t_2)}$$

$$\Sigma P_P + \Sigma E_P - \Sigma C_P = \Sigma O_{P(t_2)} - \Sigma O_{P(t_1)}$$

However, since

$$\Sigma O_{P(t_2)} - \Sigma O_{P(t_1)} = \Delta \Sigma O_P \quad \text{(From 7)}$$

then

$$\Sigma P_P + \Sigma E_P - \Sigma C_P = \Delta \Sigma O_P \qquad (30)$$

But

$$\Sigma E_P = 0 \quad \text{(From 28)}$$

and therefore

$$\Delta \Sigma O_P = \Sigma P_P - \Sigma C_P \qquad (31)$$

Similarly, assuming for the moment that all exchange activity is confined to financial objects, then for any one sector of the economy the change in the stock of financial objects between two given points of time may be expressed as follows:

$$\Sigma O_{F(t_1)} + \Sigma P_F + \Sigma E_F - \Sigma C_F = \Sigma O_{F(t_2)}$$

$$\Sigma P_F + \Sigma E_F - \Sigma C_F = \Sigma O_{F(t_2)} - \Sigma O_{F(t_1)}$$

However, since

$$\Sigma O_{F(t_2)} - \Sigma O_{F(t_1)} = \Delta \Sigma O_F \quad \text{(From 8)}$$

then

$$\Sigma P_F + \Sigma E_F - \Sigma C_F = \Delta \Sigma O_F \tag{32}$$

But

$$\Sigma E_F = 0 \quad \text{(From 29)}$$

and therefore

$$\Delta \Sigma O_F = \Sigma P_F - \Sigma C_F \tag{33}$$

Consequently, the following relationships exist:

$$\Delta \Sigma O_P = \Sigma P_P - \Sigma C_P \quad \text{(From 31)}$$

$$\Delta \Sigma O_F = \Sigma P_F - \Sigma C_F \quad \text{(From 33)}$$

However,

$$\Delta\Sigma O_E = \Delta\Sigma O_P + \Delta\Sigma O_F \quad \text{(From 7), and}$$

$$\Delta R = \Delta\Sigma O_E \quad \text{(From 3)}$$

Therefore, there is a logical connectivity between the constructs relating to economic activity and the theoretical constructs of the model.

For the economy as a whole, the exchange of objects between sectors neither increases nor decreases the total stock of objects, for one sector's addition of physical objects to stocks is another sector's reduction, and vice versa. Similarly, one sector's addition of financial objects to stocks is another's reduction, and conversely. Therefore, the relationships expressed in (31) and (33) are valid for the economy as a whole.

For a single sector, however, the assumption that exchange activity consists of either entirely physical objects or entirely financial objects may now be relaxed. Some or all of the exchange activity may consist of partly physical objects and partly financial objects. Under such circumstances the sector may wind up on balance exchanging physical objects for financial objects or vice versa, in which case:

$$\Sigma E_E = S_E - U_E$$

But

$$\Sigma E_P \neq S_P - U_P$$

and

$$\Sigma E_F \neq S_F - U_F$$

Therefore, for a single sector, the following relationships hold:

$$\Delta \Sigma O_P = \Sigma P_P \pm \Sigma E_P - \Sigma C_P \qquad (34)$$

$$\Delta \Sigma O_F = \Sigma P_F \pm \Sigma E_F - \Sigma C_F \qquad (35)$$

Transactors. The ninth operational construct relates to the classification of transactors.

OC 9. Individual transactors are classified into relatively homogeneous groups called sectors.

For the purposes of classification, let

T^S = A sector,

T = A transactor,

T_1 = A transactor possessing certain characteristics with respect to economic behavior,

T_2 = A transactor possessing certain characteristics with respect to economic behavior that are substantially different from those possessed by T_1, and so forth.

Thus, all transactors possessing the characteristics of T_1 may be grouped into one sector (T_1^S), all those possessing the characteristics of T_2 may be grouped into a second sector (T_2^S), and so forth. Within each sector, a different second subscript (1, 2, ..., j) may be assigned to identify each individual transactor. The following relationships will therefore exist in the model.

1. The aggregate transactors possessing characteristics common to T_1^S is:

$$\Sigma T_1^S = T_{11} + T_{12} + \ldots + T_{1n_1} \quad (36)$$

2. Similarly, the aggregate transactors possessing characteristics common to T_2^S is:

$$\Sigma T_2^S = T_{21} + T_{22} + \ldots + T_{2n_2} \quad (37)$$

3. The aggregate transactors possessing characteristics common to the final sector T_j^S is:

$$\Sigma T_j^S = T_{j1} + T_{j2} + \ldots + T_{jn_j} \quad (38)$$

4. Finally, for the economy as a whole, the entire population of transactors may be expressed as:

$$\Sigma T^S = \Sigma T_1^S + \Sigma T_2^S + \ldots + \Sigma T_j^S \quad (39)$$

However, in the model, every transactor possesses economic objects, and from (1)

$$T^{S}_{pos} = R$$

Therefore, there is a logical relationship between the transactor and other elements of the model, and its coherence is maintained.

Measurement

The final two operational constructs relate to the measurement of physical and financial objects.

OC 10. The economic objects to be measured are the total stock of physical and financial objects as at a given point of time.

OC 11. The economic object has a price which approximates the present value (discounted amount) of its future revenue stream.

Conceptually, the value of an economic object is the present value of its future revenue stream. This concept serves a guidance function in the proposed model and therefore will be considered in this section on measurement along with approximations to the conceptual approach.

Physical objects. The sector's total stock of physical objects as at a given point of time is represented

by the disaggregation at (15). To determine the value of that stock, it is necessary to determine the present value (discounted amount) of the future revenue stream of each individual object in the stock using the formula at (5) as follows:

$$\Sigma V_0^{0_1} = \sum_{t=1}^{n} \frac{R_{0_{11_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{0_{12_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{0_{1n_{1_t}}}}{(1+i)^t} \quad (40)$$

$$\Sigma V_0^{0_2} = \sum_{t=1}^{n} \frac{R_{0_{21_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{0_{22_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{0_{2n_{2_t}}}}{(1+i)^t} \quad (41)$$

$$\vdots \qquad \vdots \qquad \vdots \qquad \vdots$$

$$\Sigma V_0^{0_j} = \sum_{t=1}^{n} \frac{R_{0_{j1_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{0_{j2_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{0_{jn_{j_t}}}}{(1+i)^t} \quad (42)$$

Since the value of the stock of economic objects is equal to the sum of the value of all its parts (P9), then the value of the stock of physical objects (ΣO_P^V) is

$$\sum_{P=1}^{j} V_0^{0_P} = \Sigma V_0^{0_1} + \Sigma V_0^{0_2} + \ldots + \Sigma V_0^{0_j} \quad (43)$$

$$= \Sigma O_P^V \quad (44)$$

However, the conceptual approach to valuation is not operational for most physical objects. Therefore, in order to make the model operational, it will be necessary to assign to each physical object in the disaggregation at (15) a price (p_P) which is determined by means of the conceptual approach or an approximation thereof. The individual valuations may be presented as follows:

$$\Sigma p_1 o_1 = p_{11} o_{11} + p_{12} o_{12} + \cdots + p_{1n_1} o_{1n_1} \tag{45}$$

$$\Sigma p_2 o_2 = p_{21} o_{21} + p_{22} o_{22} + \cdots + p_{2j_2} o_{2n_2} \tag{46}$$

$$\vdots \qquad \vdots \qquad \vdots \qquad \vdots$$

$$\Sigma p_j o_j = p_{j1} o_{j1} + p_{j2} o_{j2} + \cdots + p_{jn_j} o_{jn_j} \tag{47}$$

Therefore, the value of the sector's stock of physical objects is:

$$\sum_{P=1}^{j} p_P o_P = \Sigma p_1 o_1 + \Sigma p_2 o_2 + \cdots + \Sigma p_j o_j \tag{48}$$

$$= \Sigma o_P^{v'}$$

However, since p_P approximates the discounted future receipts of the physical object, then

$$\sum_{P=1}^{j} p_P O_P \text{ approximates } \sum_{P=1}^{j} V_1^{O_P} \tag{49}$$

and

$$\Sigma O_P^{V'} \text{ approximates } \Sigma O_P^{V} \tag{50}$$

Financial assets. The sector's total stock of financial assets as at a given point of time is represented by the disaggregation at (19). Conceptually, the value of the stock is determined by calculating the present value of the future revenue stream of each object in the stock as follows:

$$\Sigma V_o^{A_1} = \sum_{t=1}^{n} \frac{R_{A_{11_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{A_{12_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{A_{1n_1}}}{(1+i)^t} \tag{51}$$

$$\Sigma V_o^{A_2} = \sum_{t=1}^{n} \frac{R_{A_{21_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{A_{22_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{A_{2n_2}}}{(1+i)^t} \tag{52}$$

$$\vdots \qquad\qquad \vdots \qquad\qquad \vdots \qquad\qquad \vdots$$

$$\Sigma V_o^{A_k} = \sum_{t=1}^{n} \frac{R_{A_{k1_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{A_{k2_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{A_{kn_k}}}{(1+i)^t} \tag{53}$$

The value of the stock of financial assets ($\Sigma 0_F^V$) may be expressed as

$$\sum_{F=1}^{k} V_0^{A_F} = \Sigma V_0^{A_1} + \Sigma V_0^{A_2} + \ldots + \Sigma V_0^{A_k} \tag{54}$$

$$= \Sigma A_F^V \tag{55}$$

Although the conceptual approach is operational for a substantial range of financial assets, it is not operational for such financial assets as marketable securities where the revenue stream is uncertain, and where market prices are a close approximation to present value. Thus as in the case of physical objects, in order to make the model operational, it will be necessary to assign to each financial asset in the disaggregation at (19) a price (p_F) which is determined by means of the conceptual approach or an approximation thereof. The individual valuations may be presented as follows:

$$\Sigma p_1 A_1 = p_{11} A_{11} + p_{12} A_{12} + \ldots + p_{1n_1} A_{1n_1} \tag{56}$$

$$\Sigma p_2 A_2 = p_{21} A_{21} + p_{22} A_{22} + \ldots + p_{2n_2} A_{2n_2} \tag{57}$$

$$\vdots \qquad \vdots \qquad \vdots \qquad \vdots$$

$$\Sigma p_k A_k = p_{k_1} A_{k_1} + p_{k_2} A_{k_2} + \ldots + p_{kn_k} A_{kn_k} \tag{58}$$

Therefore, the value of the sector's stock of financial assets is:

$$\sum_{F=1}^{k} p_F A_F = \Sigma p_1 A_1 + \Sigma p_2 A_2 + \ldots + \Sigma p_k A_k \qquad (59)$$

$$= \Sigma A_F^{V'}$$

However, since p_F approximates the discounted future receipts of the financial object, then

$$\sum_{F=1}^{k} p_F A_F \text{ approximates } \sum_{F=1}^{R} V_0^{A_F} \qquad (60)$$

and

$$\Sigma A_F^{V'} \text{ approximates } \Sigma A_F^{V} \qquad (61)$$

Liabilities. Since a liability is someone else's financial asset and conversely, it follows that the basis of valuing a given individual liability should correspond to the basis used in valuing the offsetting financial asset. Accordingly, given that the sector's total stock of liabilities as at a given point of time is represented by the disaggregation at (21), then conceptually, the value of the stock is determined by calculating the present value of the future payment stream of each object in the stock as follows:

$$\Sigma V_0^{L_1} = \sum_{t=1}^{n} \frac{R_{L_{11_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{L_{12_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{L_{1n_{1_t}}}}{(1+i)^t} \quad (62)$$

$$\Sigma V_0^{L_2} = \sum_{t=1}^{n} \frac{R_{L_{21_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{L_{22_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{L_{2n_{2_t}}}}{(1+i)^t} \quad (63)$$

$$\vdots \qquad \vdots \qquad \vdots \qquad \vdots$$

$$\Sigma V_0^{L_m} = \sum_{t=1}^{n} \frac{R_{L_{m1_t}}}{(1+i)^t} + \sum_{t=1}^{n} \frac{R_{L_{m2_t}}}{(1+i)^t} + \ldots + \sum_{t=1}^{n} \frac{R_{L_{mn_{m_t}}}}{(1+i)^t} \quad (64)$$

The value of the stock of liabilities (ΣL^V) may be expressed as:

$$\sum_{L=1}^{m} V_0^{L_L} = \Sigma V_0^{L_1} + \Sigma V_0^{L_2} + \ldots \Sigma V_0^{L_m} \quad (65)$$

$$= \Sigma L^V \quad (66)$$

However, for the model to be operational, it was necessary to assign to each financial asset a price which was determined by means of the conceptual approach or an approximation thereof. Assigning identical prices (p_L) to the respective offsetting liabilities, the values for the individual liabilities in the disaggregation at (21) may be presented as follows:

$$\Sigma p_1 L_1 = p_{11}L_{11} + p_{12}L_{12} + \cdots + p_{1n_1}L_{1n_1} \quad (67)$$

$$\Sigma p_2 L_2 = p_{21}L_{21} + p_{22}L_{22} + \cdots + p_{2n_2}L_{2n_2}$$

$$\vdots \qquad \vdots \qquad \vdots \qquad \vdots$$

$$\Sigma p_m L_m = p_{m1}L_{m1} + p_{m2}L_{m2} + \cdots + p_{mn_m}L_{mn_m}$$

Therefore the value of the sector's stock of liabilities is:

$$\sum_{L=1}^{m} p_L L_L = \Sigma p_1 L_1 + \Sigma p_2 L_2 + \cdots + \Sigma p_m L_m \quad (68)$$

$$= \Sigma L_L^{v'} \quad (69)$$

However, since p_L approximates the discounted future payments of the liability, then

$$\sum_{L=1}^{m} p_L L \text{ approximates } \sum_{L=1}^{m} V_0^{L_L} \quad (70)$$

and

$$\Sigma L_L^{v'} \text{ approximates } \Sigma L^v \quad (71)$$

In summary then, the present (discounted) value of:

1. $$\Sigma O_P = \Sigma O_P^v = \sum_{P=1}^{j} V_0^{O_P} \quad (72)$$

$$2.\quad \Sigma A_F = \Sigma A_F^V = \sum_{F=1}^{k} V_0^{A_F} \tag{73}$$

$$3.\quad \Sigma L = \Sigma L^V = \sum_{L=1}^{m} V_0^{L_L} \tag{74}$$

Approximations to the above three aggregates are:

$$1.\quad \Sigma O_P = \Sigma O_P^{V'} = \sum_{P=1}^{j} p_P O_P \tag{75}$$

$$2.\quad \Sigma A_F = \Sigma A_F^{V'} = \sum_{F=1}^{k} p_F A_F \tag{76}$$

$$3.\quad \Sigma L = \Sigma L_L^{V'} = \sum_{L=1}^{m} p_L L_L \tag{77}$$

Since

$$\Sigma O_F = \Sigma A_F + \Sigma L$$

then

$$\Sigma O_F^V = \Sigma A_F^V + \Sigma L^V \tag{78}$$

$$= \sum_{F=1}^{k} V_0^{A_F} + \sum_{L=1}^{m} V_0^{L_L} \tag{79}$$

which is approximated by

$$\Sigma O_F^{V'} = \Sigma A_F^{V'} + \Sigma L_L^{V'} \tag{80}$$

$$= \sum_{F=1}^{k} p_F A_F + \sum_{L=1}^{m} p_L L_L \tag{81}$$

Moreover, since

$$\Sigma O_E = \Sigma O_P + \Sigma O_F$$

then

$$\Sigma O_E^V = \Sigma O_P^V + \Sigma O_F^V \qquad (82)$$

which is approximated by

$$\Sigma O_E^{V'} = \Sigma O_P^{V'} + \Sigma O_F^{V'} \qquad (83)$$

Flows. The model contains two kinds of flows: non-financial flows consisting of physical objects and financial flows consisting of financial objects. Flows are generated by three kinds of economic activity: production, consumption and exchange. In the case of production and consumption, the objects in the flow process will be valued on a basis identical to that used in the valuation of stocks. In the case of objects entering into the exchange process, the basis of their valuation will be their exchange price. Conceptually, for any given object, its value in the flow process will be identical to its value in the stock of objects.

Given that

ΣP = The sum of the objects that have entered into production during a given period of time.

ΣC = The sum of the objects that have been consumed during a given period of time.

ΣE = The sum of the objects that have entered into exchange during a given period of time.

v = Superscript denoting aggregate value.

P = Subscript denoting physical objects.

F = Subscript denoting financial objects.

Then the following relationships hold for the sector

$$\Delta\Sigma O_P^V = \Sigma P_P^V \pm \Sigma E_P^V - \Sigma C_P^V$$

$$\Delta\Sigma O_F^V = \Sigma P_F^V \pm \Sigma E_F^V - \Sigma C_F^V$$

But

$$\Delta\Sigma O_E^V = \Delta\Sigma O_P^V + \Delta\Sigma O_F^V \quad \text{(From 83)}$$

and therefore there is a logical connectivity between the value of flows and the value of the change in stocks.

Depreciation. Because of depreciation, the value of a physical object at the end of time t_1 is not the same as the value of that identical object at the beginning of time t_1. Thus, given any physical object O_{11}, the present value of its future revenue stream at the beginning of time t_1 is:

$$V_0^{O_{11}} = \sum_{t=1}^{n} \frac{R_{O_{11}t}}{(1+i)^t} \quad \text{(From 40)}$$

Similarly, the present value of the future revenue stream of O_{11} at the beginning of time t_2 is

$$V_1^{O_{11}} = \sum_{t=2}^{n} \frac{R_{O_{11_t}}}{(1+i)^t}$$

By deduction, the amount of the revenue generating capacity of O_{11} which has been exhausted during the period t_1 is

$$D_{11} = V_0^{O_{11}} - V_1^{O_{11}}$$

and represents the amount of depreciation of O_{11} during t_1.

The amount of depreciation of each individual physical object at (15) could be similarly calculated for the time period t_1 and presented as follows:

$$\Sigma D_1 = D_{11} + D_{12} + \ldots + D_{1n_1}$$

$$\Sigma D_2 = D_{21} + D_{22} + \ldots + D_{2n_2}$$

$$\vdots \qquad \vdots \qquad \vdots \qquad \vdots$$

$$\Sigma D_j = D_{j1} + D_{j2} + \ldots + D_{jn_j}$$

and the total depreciation of the stock of physical objects may then be expressed as follows:

$$\sum_{T=1}^{j} D_T = \Sigma D_1 + \Sigma D_2 + \ldots \Sigma D_j$$

Depreciation has been determined on the basis of the conceptual approach to valuation. The foregoing may be operationalized by using approximations to the present value of future revenue streams. Thus, since

$$p_{11}{}^{0}{}_{11} \text{ approximates } V_0^{0_{11}} = \sum_{t=1}^{n} \frac{R_{0_{11_t}}}{(1+i)^t} \quad \text{(From 40 and 45)}$$

then let

$$p_{11}^{1}{}^{0}{}_{11} \text{ approximate } V_1^{0_{11}} = \sum_{t=2}^{n} \frac{R_{0_{11_t}}}{(1+i)^t}$$

and therefore

$$p_{11}{}^{0}{}_{11} - p_{11}^{1}{}^{0}{}_{11} \text{ approximates } V_0^{0_{11}} - V_1^{0_{11}}$$

Let

$$D'_{11} = p_{11}{}^{0}{}_{11} - p_{11}^{1}{}^{0}{}_{11}$$

Since

$$D_{11} = V_0^{0_{11}} - V_1^{0_{11}}$$

then

$$D'_{11} \text{ approximates } D_{11}$$

and

$$\sum_{T=1}^{j} D'_T \text{ approximates } \sum_{T=1}^{j} D_T$$

Integration of the Proposed Model

In the critical analysis in Chapter III, it was observed that the flow of funds model of the Federal Reserve Board was not completely integrated with the National Income and Product Accounts of the Commerce Department. It was also observed that in a report to the United Nations regarding the United Nations model, Statistics Canada noted a lack of adequate integration between the production accounts on the one hand, and the income and outlay and flow of resources accounts on the other. The proposed model achieves complete integration between flow of resources accounts and national income and product accounts. This may be demonstrated in the following manner.

Let ΣO^{V}_{in} = The value of objects placed into production

ΣO^{V}_{out} = The value of objects emerging from production

VA = Value added

S = Saving

I = Investment

Then for any one sector:

$$\Sigma P^{V}_{P} = \Sigma O^{V}_{out} - \Sigma O^{V}_{in}$$

$$= VA$$

$$S = VA \pm \Sigma E_P^V - \Sigma C_P^V$$

$$= I$$

$$I = [\Sigma O_{P(t_2)}^V - \Sigma O_{P(t_1)}^V + D_P] + [\Sigma O_{F(t_2)}^V - \Sigma O_{F(t_1)}^V]$$

$$= \Delta\Sigma O_P^V + \Delta\Sigma O_F^V$$

The proposed model may also be integrated with Input-Output tables by disaggregating ΣP_P^V to show the flow of physical objects between industries.

Features of the Proposed Model

The proposed model is an improvement over the Federal Reserve Board and Canadian models in several respects. First, the proposed model is more complete in that it contains a stock of nonfinancial resources which is excluded from the other two models. The information provided by the proposed model on nonfinancial resources facilitates analysis of the productive capacity of various sectors of the economy, and the efficiency with which resources are being utilized. In addition, the stock of nonfinancial resources provides a magnitude to which changes in the stock of real assets may be meaningfully related, it affords a basis for the computation of various analytical ratios which are not available at present, and it furnishes the data which makes it possible

to analyze the density of financial activity in the economy. The stock of nonfinancial resources also provides information for a more adequate analysis of the market for consumers' and producers' goods, and of the demand for capital, since expenditures by consumers and capital outlays by business depend not only on their income, but also on their stocks of financial assets, liabilities, inventories and real assets. Moreover, the proposed model demonstrates the interaction that takes place between nonfinancial and financial resources. On the one hand the model reflects productive activity which accounts for changes in real assets, and financial flows which finance that productive activity. The model therefore provides information on how additional productive resources are acquired, and provides a basis for analyzing and forecasting future expansion. On the other hand the model reflects the movement of nonfinancial resources between sectors and the financial activity that facilitates the movement.

Second, unlike the Federal Reserve Board, Canadian and United Nations models, the proposed model is completely coherent. Depreciation, for example, is incorporated as an integral part of the proposed model. This is accomplished by treating depreciation as the expired portion of the revenue generating capacity of stocks rather than as the write-off of prior period costs. To the extent that depreciation is more accurately stated, so the information provided to its users with respect to saving, investment and the net value of the

stock of nonfinancial resources will also be more accurately stated. Stocks are also incorporated as an integral and coherent part of the model by reflecting the direct relationship between stocks on the one hand and production, consumption, and exchange activity on the other. The United Nations model fails to do this.

Third, the proposed model is internally consistent, and in addition is seen to be more complete and more coherent than the Federal Reserve Board and Canadian models. It therefore provides an improved framework for the accumulation and reconciliation of information. The Federal Reserve Board and Canadian models focus for a given period of time on aggregate current transactions, capital transactions and financial transactions, i.e. on

$$\Sigma T_C,\ \Sigma T_R \text{ and } \Sigma T_F$$

However, the existing models lack a means of assessing the accuracy and completeness of the aggregates. The proposed model overcomes this deficiency, for it contains stocks which are periodically observed and measured. Thus, it is possible to compare the magnitude of flows represented by production, consumption and exchange activity for a given period of time with the magnitude of change in the stock of resources between two given points of time. The extent to which the two amounts correspond would provide an indication of the completeness and accuracy of the information being provided.

Fourth, the proposed model contains features which permit integration with the national income and product accounts on the one hand and input-output tables on the other. One such feature is common definitions which overcome the obstacle to complete integration of income and product accounts. Another feature is common sectors which overcome the obstacle to complete integration in the United Nation's model and permit the extension of statistical data to other areas such as input-output tables.

Fifth, the proposed model is as operational as the existing models. Although the proposed model is limited by a number of postulates, these postulates can be found to exist as implicit assumptions in the existing models. Thus, since the proposed model is as operational as the existing ones and yet supplies more complete and more accurate information on the one hand and contains features which permit integration with other accounts on the other, the model is an improvement over existing ones.

Illustration of the Proposed Model

The purpose of the illustration in Figure 3 is to present in diagramatic form the structure of the flow of resources model. The coherence and internal consistency of the model is demonstrated by means of the manner in which the various elements have been arranged and connected to

one another in the diagram, and by means of the logical relationships of the various elements expressed in symbolic form. Table 3 contains a summary of symbols used in the illustration.

The model illustrates the flow of resources for a sector. The sector possesses a stock of economic resources as at t_1 consisting of:

1. A stock of physical objects denoted by the symbol ΣO_P in a circle, and
2. A stock of financial objects denoted by the symbol ΣO_F in a circle.

A flow of resources occurs as a result of the sector's participation in the following three kinds of economic activity:

1. Exchange activity denoted by the symbol E in broken rectangles.
2. Production activity denoted by the symbol P in a broken rectangle.
3. Consumption activity denoted by the symbol C in a broken rectangle.

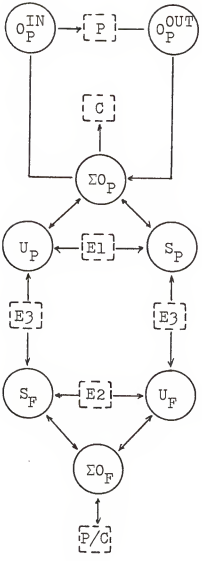

Figure 3. The Proposed Flow of Resources Model

Table 3

List of Symbols Used in Figure 3

ΣO_P	=	Stock of physical objects
ΣO_F	=	Stock of financial objects
S_P	=	Source of physical objects
U_P	=	Use of physical objects
S_F	=	Source of financial objects
U_F	=	Use of financial objects
E	=	Exchange activity
P	=	Production activity
C	=	Consumption activity
P/C	=	Production/Consumption activity
O_P^{IN}	=	Physical objects in
O_P^{OUT}	=	Physical objects out
$\longrightarrow$	=	Direction of flow

The flow of objects which occurs as a result of exchange activity involves:

1. A source of objects denoted by circles containing the symbols S_P for source of physical objects and S_F for source of financial objects.

2. A use of objects denoted by circles containing the symbols U_P for use of physical objects and U_F for use of financial objects.

Similarly, the flow of objects which occurs as a result of production activity involves:

1. An input, denoted by a circle containing the symbol O_P^{IN}, from the stock of physical objects into the production process.

2. The production process, denoted by a broken rectangle containing the symbol P, which represents a transformation process.

3. An output, denoted by a circle containing the symbol O_P^{OUT}, from the production process into the stock of physical objects.

The flow of objects which occurs as a result of production activity is denoted by a broken rectangle containing the symbol C. Since consumption is an extinction process in the flow of resources model, the flow of objects ends at C.

Exchange activity in the model is classified into three types. The first type, identified in the model as E1, involves an exchange of one physical object for another. By way of example, the sector may exchange a physical object such as machinery for a different physical object such as wheat. However, any economic activity relating to exchange involves a source of objects and a simultaneous use of objects. Since a source of objects involves a decline in the stock of physical objects while a use involves an increase in that stock, the giving up of the machinery by the sector (a reduction in the stock of that object) is a source of physical objects, while the simultaneous receiving of the wheat (an increase in the stock of that object) is a use of physical objects.

The second type of exchange activity, identified in the model as E2, involves an exchange of one financial object for another. As an illustration, the sector may exchange a financial object such as an account receivable (a financial asset) for another financial object such as a note receivable (also a financial asset). However, a source of financial objects involves either an increase in the transactor's stock of liabilities or a decline in his stock of financial assets, and a use of financial objects involves either an increase in his stock of financial assets or a decline in his stock of liabilities.

Therefore, the giving up of the account receivable, a financial asset, involves a decline in the transactor's

stock of that object (a source of financial objects), while the simultaneous acquisition of the note receivable, also a financial asset, involves an increase in his stock of that object (a use of financial objects). This exchange of one financial asset for another results in no overall change in the transactor's stock of such objects.

As a second illustration of an E2 type of exchange activity, the transactor may exchange a financial object such as an account payable (a liability) for another financial object such as a note payable (also a liability). In such a case the giving up of the account payable reduces the transactor's stock of that object (a use of financial objects) while the simultaneous acquisition of the note payable increases his stock of that object (a source of financial objects). As in the case of the exchange of one financial asset for another, so this exchange of one liability for another results in no overall change in the transactor's stock of such objects.

The third type of exchange activity is identified in the model as E3 and reflects interaction between physical and financial objects. For example, the transactor may exchange a physical object such as land for a financial object such as money (a financial asset) in which case the giving up of the land reduces his stock of that object (a source of physical objects), and the simultaneous receiving of money (a financial object) increases his stock of that object (a

use of financial objects). This type of a transaction therefore results in an overall increase in the transactor's stock of financial objects, and a decline in his stock of physical objects.

Similarly, the transactor may exchange a financial object such as a mortgage payable (a liability) in return for a physical object such as a building in which case the incurrance of the liability increases his stock of liabilities (a source of financial objects) on the one hand while the simultaneous acquisition of the building increases his stock of physical objects (a use of physical objects). In this example, as a result of the interaction between the transactor's physical and financial objects, there was an overall increase in his stock of physical objects, and an increase in his stock of liabilities.

In the model, only exchange activities involve a simultaneous source and use of resources; production and consumption activities do not. Thus, P demonstrates the production flow in which physical objects flow from the transactor's stock of these objects, have their characteristics transformed, and then return to the stock. This activity may increase the number of objects in the transactor's stock of physical objects, decrease it, or leave it unchanged.

In the same manner, C demonstrates the consumption flow in which physical objects flow from the transactor's

stock of objects and are consumed. Since consumption results in the extinction of physical objects, there is a corresponding decline in the stock of physical objects which is illustrated by the absence of a return flow to the stock.

Similarly, P/C demonstrates the production and consumption flows in which financial objects are created and flow to the transactor's stock of financial objects, and conversely flow from his stock and are cancelled. Thus, the acquisition of a machine in exchange for an account payable results in the production of a liability, and a corresponding increase in the transactor's stock of financial objects. Conversely, payment of the account results in the discharge of the debt, and a corresponding decline in the transactor's stock of such objects.

In a similar fashion, the disposal of a machine in exchange for an account receivable results in a decline in the transactor's stock of physical objects, and in the production of a financial asset which increases his stock of financial objects. A later payment of the account by the debtor will result in the discharge (consumption) of the financial asset, and a corresponding decline in the transactor's stock of such objects.

Arrows connect the various circles and illustrate the flow of economic objects which result from the three kinds of economic activity:

1. Production activity which results in a flow of physical objects from ΣO_P (a stock of physical objects) into the conversion process and back into ΣO_P, and a flow of financial objects into ΣO_F.

2. Consumption activity which results in a flow of physical objects from ΣO_P into the extinction process, and a flow of financial objects from ΣO_F into cancellation.

3. Exchange activity resulting in a flow of economic objects which reflects interaction between physical objects, financial objects, and both physical and financial objects.

The arrows demonstrate the back and forth movement between sources (S_P) and uses (U_P) of physical objects (O_P) on the one hand, and sources (S_F) and uses (U_F) of financial objects (O_F) on the other. The arrows similarly demonstrate the interplay between physical objects and financial objects. The model therefore depicts a continuous flow process involving sources and uses of physical and financial objects.

The circles denoting sources and uses of economic objects are connected by means of arrows to circles denoting stocks of physical (ΣO_P) and financial (ΣO_F) objects. The arrows demonstrate that each of the two stocks of economic

objects is simply a stopping point in a continuous flow process involving both physical and financial objects. The arrows also demonstrate that flows are derived from stocks, that stocks are a source of flows, and that stocks and flows are interdependent.

For any one sector, then, the model demonstrates, as at a given point of time, stocks on hand consisting of stocks of physical objects and stocks of financial objects. The model also demonstrates, for a given period of time, the flow of objects resulting from production, consumption and exchange activity, and the interaction that takes place between physical and financial objects.

For the economy as a whole, the model illustrates the total stock of physical and financial objects on the one hand, and the movement of physical and financial objects between transactors representing sectors on the other. Thus, the stocks of objects represent an aggregation of the stocks of individual sectors of the economy. Similarly, the production and consumption activities represent an aggregation of the production and consumption activities of individual sectors.

The interplay between physical objects on the one hand and financial objects on the other illustrates the flow of objects between sectors. Thus, the movement of a machine from one sector to another results in a source of physical objects for one sector (a reduction in stocks) and

a simultaneous use of physical objects (an increase in stocks) for the other sector. The other half of the transaction will involve a simultaneous movement of either a physical object or a financial object.

A movement of a physical object such as another machine in exchange will result in a flow in the opposite direction with simultaneous and offsetting increases and decreases respectively in the stocks of the receiving and transferring sectors. Likewise, a movement of financial objects will result in a use of financial assets in one sector and a simultaneous use of liabilities in the other.

Similarly, the model illustrates the interaction of economic objects between the sector of an economy or a whole nation on the one hand, and the rest of the world on the other. In such a case, ΣO_P denotes the entire stock of physical objects, and ΣO_F the entire stock of financial objects. Sources and uses of physical objects reflect exports and imports respectively of a nation or sector. In addition, sources and uses of financial objects reflect real financial assets and real liabilities for a nation or sector, since the offsetting liabilities and financial assets are in the possession of the rest of the world and hence will not cancel out.

Logical Connectivity

The coherence and internal consistency of the model may be also demonstrated by expressing in symbolic form the

relationship which exists between the various elements in Figure 3.

Stocks. The total stock of economic objects (ΣO_E) as at time t_1 for a sector is:

$$\Sigma O_E = \Sigma O_P + \Sigma O_F.$$

Flows. The change in the stock of economic objects is the result of economic activity. Since economic activity consists of production, consumption and exchange, the change in the stock of physical objects between time t_1 and t_2 may be expressed as:

$$\Sigma O_{P(t_2)} = \Sigma O_{P(t_1)} + \Sigma P - \Sigma C \pm \Sigma E.$$

$$\Sigma O_{P(t_2)} - \Sigma O_{P(t_1)} = \Sigma P - \Sigma C \pm \Sigma E.$$

However, this change in the stock of physical objects ($\Delta\Sigma O_P$) between time t_1 and t_2 reflects the flow of physical objects during the period, and thus:

$$\Sigma O_{P(t_2)} - \Sigma O_{P(t_1)} = \Delta\Sigma O_P.$$

Similarly, the change in the stock of financial objects between time t_1 and t_2 may be expressed as:

$$\Sigma O_{F(t_2)} = \Sigma O_{F(t_1)} + \Sigma P - \Sigma C \pm \Sigma E, \text{ or}$$

$$\Sigma O_{F(t_2)} - \Sigma O_{F(t_1)} = \Sigma P - \Sigma C \pm \Sigma E.$$

However, the change in the stock of financial objects ($\Delta\Sigma O_F$) between time t_1 and t_2 reflects the flow of financial objects during the period, and therefore:

$$\Sigma O_{F(t_2)} - \Sigma O_{F(t_1)} = \Delta\Sigma O_F.$$

Measurement

1. The measurement process involves identification, classification and aggregation of physical and financial objects.

2. By assumption (P9), the value of the stock of economic objects is equal to the sum of the value of all its parts.

3. The value of an economic object is the closest practical approximation to the present value of the object's future revenue stream. The approximations include current market value, replacement cost, reproduction cost, face value and book value.

4. The value of the stock of physical objects is expressed as:

$$\Sigma O_P^{V'} \text{ approximates } \Sigma O_P^V \quad \text{(From 50)}$$

5. The value of the stock of financial objects is expressed as:

$$\Sigma O_F^{V'} \text{ approximates } \Sigma O_F^{V} \quad \text{(From 80)}$$

6. Since the entire stock of economic objects consists of physical objects and financial objects, the value of the entire stock of economic objects is expressed as:

$$\Sigma O_E^{V'} = \Sigma O_P^{V'} + \Sigma O_F^{V'}$$

However, although the flow of economic objects is expressed as

$$\Delta\Sigma O_E = \Sigma O_{E(t_2)} - \Sigma O_{E(t_1)},$$

it does not follow that

$$\Delta\Sigma O_E^{V'} = \Sigma O_{E(t_2)}^{V'} - \Sigma O_{E(t_1)}^{V'}.$$

The relationship is not valid because $\Delta\Sigma O_E^{V'}$ is composed of two elements:

1. The change in the number of objects in ΣO_E during the time period t_1 t_2, and

2. Depreciation of the objects in the stock during the period.

Therefore, depreciation must be added back to obtain the value of the change in stock directly attributable to the change in objects (flow) during the period.

Depreciation

In the model, depreciation is a measure of the exhaustion of the revenue generating capacity of economic objects during a given period of time, and is expressed as follows:

$$D_P = \sum_{T=1}^{j} D'_T$$

wherein $\sum_{T=L}^{j} D'_T$ approximates $\sum_{T=1}^{j} D_T$ and

1. $\sum_{T=1}^{j} D_T$ represents for a given time period the total depreciation of the stock of physical objects based on the conceptual approach to asset valuation.

2. $\sum_{T=1}^{j} D'_T$ represents for a given time period the total depreciation of the stock of physical objects based on asset valuations approximating the conceptual approach.

Sector Aggregates

For a given period of time $t_1 t_2$, the following sector aggregates may now be deduced:

1. The value of the flow of physical objects is

$$\Delta\Sigma O^{V}_{P} = \Sigma O^{V}_{P(t_2)} - \Sigma O^{V}_{P(t_1)} + D_P$$

2. The value of the flow of financial objects is

$$\Delta\Sigma O^{V}_{F} = \Sigma O^{V}_{F(t_2)} - \Sigma O^{V}_{F(t_1)}$$

In addition, where $\Delta\Sigma O^{V}_{P} + \Delta\Sigma O^{V}_{F}$ is positive, the implication is that the sector's stock of economic objects has increased. However, an increase in the stock of economic objects is a use of resources. This in turn implies a source of resources since uses of resources are equal to sources of resources. Given that an aggregate increase in the stock of economic objects is called investment (I^{I}), and that the source of the economic objects is called saving (S^{S}), then by deduction, the following relationship exists:

$$S^{S} = \Delta\Sigma O^{V}_{P} + \Delta\Sigma O^{V}_{F}$$

$$= I^{I}$$

On the other hand, where $\Delta\Sigma O^{V}_{P} + \Delta\Sigma O^{V}_{F}$ is negative, the implication is that the sector's stock of economic objects has declined. A decline in the stock of economic objects is a source of resources, however. Once again, a source of economic resources implies a use of economic resources since sources of resources are equal to uses. Given that an aggregate decline in the stock of economic objects

is called disinvestment (I^D), and that use of the economic objects is called dissaving (S^D), then by deduction, the following relationship exists:

$$S^D = \Delta\Sigma O_P^V + \Delta\Sigma O_F^V$$
$$= I^D$$

National Aggregates

Certain sector aggregates may be summed to provide national aggregates.

Sectors. The sectors of the economy may be identified as:

$$T_A, T_B \cdots T_n$$

Stocks. The stock of physical objects for each sector may be determined as follows:

ΣO_P for T_A is $\Sigma O_{P(T_A)}$
ΣO_P for T_B is $\Sigma O_{P(T_B)}$
. . .
. . .
. . .
ΣO_P for T_n is $\Sigma O_{P(T_n)}$

The stock of physical objects for the nation as a whole is therefore a simple summation of those stocks for each of the sectors and may be expressed as:

$$\Sigma O_P = \Sigma O_{P(T_A)} + \Sigma O_{P(T_B)} + \cdots \Sigma O_{P(T_n)}.$$

Similarly, the stock of financial objects for the nation as a whole is a simple summation of the stock of financial objects for each sector, and may be expressed as:

$$\Sigma O_F = \Sigma O_{F(T_A)} + \Sigma O_{F(T_B)} + \cdots \Sigma O_{F(T_n)}.$$

Valuation. Given the sectors of the economy and the value of the stock of physical objects in each sector, the value of the stock of physical objects for the nation as a whole may be determined as follows:

The value of ΣO_P in T_A is $\Sigma O^V_{P(T_A)}$

The value of ΣO_P in T_B is $\Sigma O^V_{P(T_B)}$

. . . .

. . . .

. . . .

The value of ΣO_P in T_n is $\Sigma O^V_{P(T_B)}$

Thus, the value of the stock of physical objects for the nation as a whole is a simple summation of the value of those stocks for each sector and may be expressed as follows:

$$\Sigma O^V_P = \Sigma O^V_{P(T_A)} + \Sigma O^V_{P(T_B)} + \cdots \Sigma O^V_{P(T_n)}.$$

Similarly, the value of the stock of financial objects for the nation as a whole is a simple summation of the value of those stocks for each sector and may be expressed as:

$$\Sigma O_F^V = \Sigma O_{F(T_A)}^V + \Sigma O_{F(T_B)}^V + \cdots \Sigma O_{F(T_n)}.$$

Certain sector aggregates cancel out. These include:

$$\Sigma S^S = \Sigma S^D$$

$$\Sigma I^I = \Sigma I^D$$

$$\Sigma A_F = \Sigma L$$

In the case of financial objects, any balance remaining in the stock for the economy as a whole represents either:

1. Real financial assets (ΣA_F^R) reflecting loans to the rest of the world, or
2. Real liabilities (ΣL^R) reflecting debt to the rest of the world.

For the economy as a whole, therefore, the model depicts:

1. Stocks consisting of:
   a) ΣO_P^V, and
   b) ΣA_F^R or ΣL^R
2. Flows, which represent the change in stocks during a given period, as expressed in the following relationships:

a) $\Delta\Sigma O^{V}_{P} = \Sigma O^{V}_{P(t_2)} - \Sigma O^{V}_{P(t_1)} + D_{P}$, and

b) $\Delta\Sigma A_{F} = \Sigma A^{R}_{F(t_2)} - \Sigma A^{R}_{F(t_1)}$

c) $\Delta\Sigma L^{R} = \Sigma L^{R}_{(t_2)} - \Sigma L^{R}_{(t_1)}$

3. The contribution of each sector to the change in stocks.

4. The extent to which physical objects were transferred from one sector to another.

5. The financial objects that facilitated the transfers of physical objects.

6. The interaction that takes place between physical and financial objects.

Summary and Conclusions

The purpose of this chapter has been to develop a model which is an improvement over the current Federal Reserve Board and Canadian models. On the basis of observations made in the previous chapter, the first step was to select a number of postulates to describe the conditions under which the model was to be built, and to afford the model stability.

In order to provide the model with a theoretical frame of reference to guide subsequent operations, a set of five theoretical constructs was then formulated. The specific

operative properties of the constructs were then drawn out and formalized into a set of eleven operational constructs which connect the theoretical constructs to the existential world.

Throughout the construction of the model, the emphasis has been on arranging its various elements in such a way that they are related to one another within a structure that is coherent, internally consistent and operational. The logical connectivity of the various elements has been demonstrated both diagrammatically and by means of symbolic relationships.

The proposed model is an improvement over the Federal Reserve Board and Canadian models in that the inclusion of the stock of nonfinancial resources, and the interaction between nonfinancial and financial resources reflected by the model, provide new and useful information for the purpose of analysis, forecasting and decision-making.

In addition, the model is coherent, internally consistent and operational, and provides a logical framework for more accurate information. It is possible to assess the accuracy of the information generated by the model by reconciling financial flows on the one hand and nonfinancial flows representing production, consumption and exchange activity on the other during a given period of time with the change in the stock of financial and nonfinancial resources between two given points of time. Furthermore, the model contains features which permit integration with income and product accounts and input-output tables.

It is hypothesized that the proposed model is an improvement over existing models in that it provides information that is more complete and more accurate than the information that is being provided by the existing Federal Reserve Board and Canadian models, and may be integrated with the other national accounts. For the research project to be complete, however, the model must be tested empirically. This represents the second phase of the study and is beyond the scope of this dissertation.

SELECTED BIBLIOGRAPHY

American Accounting Association, Survey of Economic Accounting (American Accounting Association, 1958).

_____, Committee to Prepare a Statement of Basic Accounting Theory, A Statement of Basic Accounting Theory (American Accounting Association, 1966).

_____, "Report of the Committee on Accounting Theory Construction and Verification," Supplement to the Accounting Review (1971), pp. 51-79.

_____, "Report of the Committee on Research Methodology in Accounting," Supplement to the Accounting Review (1972), pp. 390-520.

_____, "Report of the Committee on Human Resource Accounting," Supplement to the Accounting Review (1973), pp. 123-179.

American Institute of Certified Public Accountants, Accounting Research Study No. 2 (AICPA, 1961).

_____, Accounting Principles Board, APB Opinion No. 3 (AICPA, 1963).

_____, Accounting Principles Board, APB Opinion No. 19 (AICPA, 1971).

Anton, Hector R., Accounting for the Flow of Funds (Houghton Mifflin Company, 1962).

Bierman, Harold, "Measurement and Accounting," The Accounting Review (July 1963), pp. 501-507.

Binkley, M. A., "Components of the Report of Financial Changes," The Accounting Review (July 1949), pp. 304-307.

Board of Governors of the Federal Reserve System, "A Flow-of-Funds System of National Accounts: Annual Estimates, 1939-1954," Federal Reserve Bulletin (October 1955), pp. 1085-1124.

_____, "Summary Flow-of-Funds Accounts: 1950-1955," Federal Reserve Bulletin (April 1957), pp. 372-391.

_____, "A Quarterly Presentation of Flow of Funds, Saving, and Investment," Federal Reserve Bulletin (August 1959), pp. 828-859.

_____, "Flow of Funds Seasonally Adjusted," Federal Reserve Bulletin (November 1962), pp. 1393-1407.

_____, "Revision of Flow of Funds Accounts," Federal Reserve Bulletin (November 1965), pp. 1533-1538.

_____, Flow of Funds Accounts: 1945-1967 (Board of Governors of the Federal Reserve System, 1968).

_____, Introduction to Flow of Funds (Board of Governors of the Federal Reserve System, 1975).

Bolon, D. S., "The Accountant's Report With Special Reference to the Statement of Application of Funds," Certified Public Accountant (August 1926), pp. 233-236.

Brummet, R. Lee, Eric C. Flamholtz, and William C. Pyle, "Human Resource Measurement - A Challenge for Accountants," The Accounting Review (April 1968), pp. 217-224.

Buckley, John W., Paul Kercher and Russell L. Mathews, "Methodology in Accounting Theory," The Accounting Review (April 1968), pp. 274-283.

Canadian Institute of Chartered Accountants, CICA Handbook, "Statement of Changes in Financial Position" (CICA, 1974).

Canning, John B., The Economics of Accountancy (The Ronald Press Co., 1929).

Carson, A. B., "A 'Source and Application of Funds' Philosophy of Financial Accounting," The Accounting Review (April 1949), pp. 159-170.

Chambers, R. J., "Blueprint for a Theory of Accounting," Accounting Research (January 1955), pp. 17-25.

_____, "Details for a Blueprint," The Accounting Review (April 1957), pp. 206-215.

_____, "The Conditions of Research in Accounting," The Journal of Accountancy (December 1960), pp. 33-39.

_____, "Measurement in Accounting," Journal of Accounting Research (Spring 1965), pp. 32-62.

Cole, William Morse, Accounts: Their Construction and Interpretation (Houghton Mifflin Company, 1908).

Cooper, W. W., "Social Accounting: An Invitation to the Accounting Profession," The Accounting Review (July 1949), pp. 233-238.

Cooper, W. W., and J. M. Crawford, "The Status of Social Accounting and National Income Statistics In Countries Other Than The United States," The Accounting Review (July 1953), pp. 221-238.

Copeland, Morris A., "Tracing Money Flows Through The United States Economy," The American Economic Review (May 1947), pp. 31-49

_____, "Social Accounting For Moneyflows," The Accounting Review (July 1949), pp. 254-266.

_____, A Study of Moneyflows in the United States (National Bureau of Economic Research, 1952).

Corbin, Donald A., "Proposals for Improving Funds Statements," The Accounting Review (July 1961), pp. 398-405

Corbin, Donald A. and Russell Taussig, "The AICPA Funds Statement Study," The Journal of Accountancy (July 1962) pp. 57-62.

Corcoran, A. Wayne, and Ching-Wen Kwang, "A Set Theory Approach to Funds-Flow Analysis," Management Accounting (September 1967), pp. 206-217.

Dawson, John C., "Monetary Analysis and The Flow of Funds: A Cyclical Model For Postwar U.S. Financial Markets," The American Economic Review (May 1958), pp. 145-157

Day, Emmett B., "Cash-Balance Approach to Funds Statement Promotes Clarity in Financial Reports," The Journal of Accountancy (April 1951), pp. 600-603.

Deinzer, Harvey T., Development of Accounting Thought (Holt, Rinehart and Winston, Inc., 1965).

Devine, Carl Thomas, "Research Methodology and Accounting Theory Formation," The Accounting Review (July 1960), pp. 387-399.

Dewey, John, Logic, The Theory of Inquiry (Holt, Rinehart, and Winston, Inc., 1938).

Dickerson, W. E., and J. Weldon Jones, "Some Observations on the Statement of Application of Funds," The Accounting Review (December 1931), pp. 277-281.

Dominion Bureau of Statistics, National Accounts: Income and Expenditure, 1926-1956 (Queen's Printer, 1962).

_____, Financial Flow Accounts, 1962-1967: A Preliminary Report (Queen's Printer, 1969a).

_____, Financial Flow Accounts, Fourth Quarter, 1968 (Queen's Printer, 1969b).

Dorrance, Graeme S., "Balance Sheets In A System Of Economic Accounts," International Monetary Fund, Staff Papers (1959-1960), pp. 168-209.

Duesenberry, James S., "A Process Approach to Flow-of-Funds Analysis," National Bureau of Economic Research, Studies in Income and Wealth (Princeton University Press, 1962), pp. 173-193.

Edwards, Edgar O., "Funds Statements for Short- and Long-Run Analysis," Journal of Business (July 1952), pp. 156-174.

Esquerré, Paul-Joseph, "Resources and Their Application," The Journal of Accountancy (May 1925), pp. 424-430.

Farman, Wilson L., "Some Basic Assumptions Underlying Social Accounting," The Accounting Review (January 1951), pp. 33-39.

_____, "National Flow-of-Funds: An Accounting Analysis," The Accounting Review (April 1964), pp. 392-404.

Fess, Philip E. and Jerry Weygandt, "The Funds Statement: Trends and Recommendations," New York Certified Public Accoutant (February 1969), pp. 120-124.

Finney, H. A., Editor (Students' Department), The Journal of Accountancy (July 1921a), pp. 64-67.

_____, Editor (Students' Department), The Journal of Accountancy (July 1921b), pp. 63-67.

_____, Editor (Students' Department), The Journal of Accountancy (December 1923), pp. 460-472.

_____, "The Statement of Application of Funds: A Reply to Mr. Esquerré," The Journal of Accountancy (June 1925), pp. 497-510.

Finney, H. A. and Herbert E. Miller, Principles of Financial Accounting: A Conceptual Approach (Prentice-Hall, 1968).

Fisher, Irving, "What is Capital?" The Economic Journal, (December 1896), pp. 509-534.

_____, "Precedents for Defining Capital," Quarterly Journal of Economics (March 1904), pp. 386-408.

_____, The Nature of Capital and Income (The Macmillan Company, 1912).

Flanders, Dwight P., "Accounting and Economics: A Note With Special Reference to 'The Teaching of Social Accounting'," The Accounting Review (January 1959), pp. 68-73.

Freund, William C., and Edward D. Zinbarg, "Application of Flow of Funds to Interest-Rate Forecasting," The Journal of Finance (May 1963), pp. 239-247.

Friend, Irwin, "Financial Statements for the Economy," The Accounting Review (July 1949), pp. 239-247.

Goldberg, Louis, "The Funds Statement Reconsidered," The Accounting Review (October 1951), pp. 485-491.

Goldberg, S. A., "Some Recent Developments In The Dominion Bureau of Statistics," The Canadian Journal of Economics and Political Science (February 1955) pp. 52-63.

Goldsmith, Raymond W. and Robert E. Lipsey, Studies in the National Balance Sheet of the United States, Volume 1 (Princeton University Press, 1963).

Gregory, Robert H., and Edward L. Wallace, "Solution of Funds Statement Problems - History and Proposed New Method," Accounting Research (April 1952), pp. 99-132.

Hagen, Everett, "National Accounting Systems, And The European Recovery Program," The Accounting Review (July 1949), pp. 248-253.

Handfield-Jones, S. J., "The National Transactions Accounts in Canada," American Statistical Association: Business and Economic Section Proceedings (1956), pp. 59-601.

_____, "The Canadian National Transactions Accounts," in National Bureau of Economic Research, Studies in Income and Wealth (Princeton University Press, 1962), pp. 103-132.

Hempel, Carl G., Fundamentals of Concept Formation in Empirical Science (University of Chicago Press, 1952).

_____, Foundations of Philosophy (Prentice-Hall, Inc., 1966).

Homburger, Richard H., "Measurement in Accounting," The Accounting Review (January 1961), pp. 94-99.

Hood, Wm. C., Financing of Economic Activity in Canada (Queen's Printer, 1958).

Humphrey, Fred L., "Statement of Application of Funds," Journal of Accountancy (December 1925), pp. 464-469.

Ijiri, Yuji, "Axioms and Structures of Conventional Accounting Measurement," The Accounting Review (January 1965), pp. 36-53.

_____, The Foundations of Accounting Measurement (Prentice-Hall, Inc., 1967).

International Association for Research in Income and Wealth, Income and Wealth, Series VIII (Bowes and Bowes, 1959).

Joergensen, Joergen, The Development of Logical Empiricism (University of Chicago Press, 1951).

Johnson, Glenn L., "Funds-Flow Equations," The Accounting Review (July 1966), pp. 510-517.

Käfer, Karl, and V. K. Zimmerman, "Notes on the Evolution of the Funds Statement of Sources and Applications of Funds," International Journal of Accounting (Spring 1967), pp. 89-121.

Kircher, Paul, "Accounting Entries and National Accounts," The Accounting Review (July 1953), pp. 191-198.

Kohler, E. L., "Accounting Concepts and National Income," The Accounting Review (January 1952), pp. 50-56.

Kwang, Ching-Wen, "The Mathematical Unity of Funds-Flow Analyses," NAA Bulletin (January 1965), pp. 49-56.

Margolis, Julius, "The Classification of Sectors In The Social Accounts," The Accounting Review (July 1953), pp. 178-186.

Mattessich, Richard, "Towards a General and Axiomatic Foundation of Accountancy," Accounting Research (October 1957), pp. 328-355.

_____, "Mathematical Models in Business Accounting," The Accounting Review (July 1958), pp. 472-481.

_____, Accounting in Analytical Methods (Richard D. Irwin, Inc., 1964).

Maynard, Gilbert P., "Modifications of Accounting Data In National Income Estimation," The Accounting Review (July 1953), pp. 199-210.

McDonald, Daniel L., "Feasibility Criteria for Accounting Measures," The Accounting Review (October 1967), pp. 662-679.

Meigs, Walter B., Charles E. Johnson, and J. David Blazouske, Accounting: The Basis for Business Decisions (McGraw-Hill, Canadian Edition, 1964).

Mendelson, Morris, "A Structure of Moneyflows," Journal of The American Statistical Association (March 1955), pp. 72-92.

Miller, Henry J., "New Terminology for Statement of Application of Funds," The Journal of Accountancy (September 1950), pp. 252-253.

Moonitz, Maurice, "Inventories and the Statement of Funds," The Accounting Review (July 1943), pp. 262-266.

_____, "Reporting on the Flow of Funds," The Accounting Review (July 1956), pp. 375-385.

Myer, John N., "A Statement of Funds or Working Capital," The Journal of Accountancy (September 1941a), pp. 258-261.

_____, "Statement of Funds" (Correspondence), The Journal of Accountancy (November 1941b), pp. 457-458.

_____, "Statements Accounting For Balance Sheet Changes," The Accounting Review (January 1944), pp. 31-38.

_____, "The 'Funds' Statement," New York Certified Public Accountant (May 1951), pp. 353-356.

Nassimbene, Raymond, "The National Income and Product Account," The Accounting Review (July 1953), pp. 211-220.

_____, "The Use of Double-Entry Accounting In National Income Accounts," The Accounting Review (January 1954), pp. 74-83.

National Bureau of Economic Research, Education, Income and Human Capital (National Bureau of Economic Research, 1970).

_____, The Measurement of Economic and Social Performance (National Bureau of Economic Research, 1973).

Nelson, Carl L., "Use of Accounting Data In National Income Estimation," The Accounting Review (July 1953), pp. 186-190.

Ohlson, Ingvar, On National Accounting (Konjunkturinstitutet, 1953).

O'Loughlin, Carleen, National Economic Accounting (Pergamon Press, 1971).

Peasnell, K. V., "A Note on the Discounted Present Value Concept," The Accounting Review (January 1977), pp. 186-189.

Polakoff, Murray E. and Others, Financial Institutions and Markets (Houghton Mifflin Co., 1970).

Powelson, John P., "Social Accounting," The Accounting Review (July 1953), pp. 651-659.

Prince, Thomas R., Extension of the Boundaries of Accounting Theory (South-Western Publishing Co., 1963).

Read, L. M., "The Development of National Transactions Accounts: Canada's Version of or Substitute for Money Flows Accounts," The Canadian Journal of Economics and Political Science (February 1957), pp. 42-56.

Ritter, Lawrence S., "An Exposition of the Structure of the Flow of Funds Accounts," The Journal of Finance (May 1963), pp. 219-229.

Rosen, L. S. and Don T. DeCoster, "'Funds' Statements: A Historical Perspective," The Accounting Review (January 1969), pp. 124-136.

Schrader, William J., "An Inductive Approach to Accounting Theory," The Accounting Review (October 1962), pp. 645-649.

Schultz, Theodore W., "Reflections on Investment in Man," Journal of Political Economy (October 1962), pp. 1-8.

Scovill, Hiram T., "Application of Funds Made Practical," The Accounting Review (January 1944), pp. 20-31.

Sigel, S. J., "A Comparison of the Structures of Three Social Accounting Systems" in National Bureau of Economic Research, Studies in Income and Wealth (Princeton University Press, 1955).

Statistics Canada, Progress and Plans In Dealing With The Revised U. N. System of National Accounts (Information Canada, 1971).

_____, Financial Flow Accounts: First Quarter, 1977 (Information Canada, 1971).

Staubus, George J., "Alternative Asset Flow Concepts," The Accounting Review (July 1966), pp. 397-412

Sterling, Robert R., Theory of the Measurement of Enterprise Income (The University Press of Kansas, 1970a).

_____, "On Theory Construction and Verification," The Accounting Review (July 1970b), pp. 444-457.

Stone, Williard E., ed., Foundations of Accounting Theory (The University of Florida Press, 1971).

Taylor, Stephen, "An analytic Summary of The Flow-of-Funds Accounts," The American Economic Review (May 1958), pp. 158-177.

_____, "Uses of Flow of Funds Accounts In the Federal Reserve System," The Journal of Finance (May 1963), pp. 249-263.

Thacker, Ronald J., Accounting Principles (Prentice-Hall, 1976).

Tuttle, Charles A., "The Fundamental Economic Principle," The Quarterly Journal of Economics (February, 1901), pp. 218-253.

_____, "The Real Capital Concept," The Quarterly Journal of Economics (November 1903), pp. 54-96.

United Nations, Department of Economic and Social Affairs, Statistical Office, A System of National Accounts, Studies in Methods, ser. F., no. 2 rev. 3 (United Nations, 1968).

Vatter, William J., The Fund Theory of Accounting and Its Implications for Financial Reports (University of Chicago Press, 1947).

_____, "Fund Flows and Fund Statements," Journal of Business (January 1953), pp. 15-25.

Walker, George T., "Limitations of the Statement of Funds Applied and Provided," The Journal of Accountancy (April 1941), pp. 342-345.

Weisbrod, Burton A., "An Expected-Income Measure of Economic Welfare," Journal of Political Economy (August 1962), pp. 355-367.

Williams, Thomas H. and Charles H. Griffin, The Mathematical Dimension of Accountancy (South-Western Publishing Co., 1964).

Yu, S. C., "Macroaccounting and Some of Its Basic Problems," The Accounting Review (April 1957), pp. 264-272.

_____, "National Position Statement: A Proposal on Operational Principles and Process," The Accounting Review (January 1959), pp. 74-83.

_____, "An Appraisal of Macroaccounting," in Aspects of Contemporary Accounting, University of Florida Accounting Series No. 4 (The University of Florida Press, 1965), pp. 25-43.

_____, "Microaccounting and Macroaccounting," The Accounting Review (January 1966), pp. 8-20.

_____, "A Flow-of-Resources Statement for Business Enterprises," The Accounting Review (July 1969), pp. 571-582.

_____, "A Reexamination of the Going Concern Postulate," International Journal of Accounting (Spring, 1971), pp. 37-58.

_____, "The Several Modes of Normative Accounting Thought: A Critical Examination," International Journal of Accounting (Spring, 1974), pp. 83-104.

_____, The Structure of Accounting Theory (The University Presses of Florida, 1976).

BIOGRAPHICAL SKETCH

Robert William Stolar was born on 29 April 1931 in Toronto, Ontario. After graduating from North Toronto Collegiate Institute in 1952, he obtained the Bachelor of Commerce degree from the University of Toronto in 1956 and the Master of Business Administration degree from McMaster University in 1966. He also obtained the professional accounting designations of Chartered Accountant in 1960 and Registered Industrial Accountant (Gold medalist) in 1967.

He has had extensive experience in professional practice as an accountant, in industry as a corporation comptroller, and in federal government service with the Department of National Revenue and the Department of Finance. At present he is Associate Professor of Accounting and Chairman of the Accounting Area at Wilfrid Laurier University, Waterloo, Ontario, and is a member of a number of academic and professional organizations including The American Accounting Association, The Academy of Accounting Historians, The Canadian Academic Accounting Association, the Learned Societies of Canada and the Canadian Tax Foundation.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

S. C. Yu, Chairman
Professor of Accounting

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

C. W. Fristoe
Associate Professor of Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

J. H. James
Associate Professor of Management

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

W. E. Stone
Professor of Accounting

This dissertation was submitted to the Graduate Faculty of the Department of Accounting in the College of Business Administration and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

August, 1978

_____

Dean, Graduate School